AMERICAN ARTISAN

WARM AIR HEATING • SHEET METAL
CONTRACTING • AIR CONDITIONING

IN THIS ISSUE

FEBRUARY 29, 1932

There is a Globe Product for every sheet metal building need. To use these superior products — which cost no more than many inferior grades — is to build your business on a substantial and permanent basis.

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"You ain't going to make me do over this job"

Ancient documents recently unearthed in the middle of the Aegean Sea show that with this statement Hercules completed his job of cleaning the Augean Stables.

In a letter to Eurystheus, King of Mycenae, he writes:

Dear King, you old highbinder, I've got those Augean Stables clean and they're going to stay clean, too. I outgoldberged Rube Goldberg and fixed up a system so that every time it rains the water from the roof will do what I just made the river Styx do. Of course, I used GOHI (pronounced go-high) because I want this job to last until 1932.

Hercules
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GOHI

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Industrial Roofing
Merchandising
Ventilating

FEBRUARY 29, 1932

VOL. 101, NO. 5

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Founded 1880

~

J. D. Wilder
Editor

Platte Overton
Engineering Editor

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A Product Research Department

THE crystal ball may guide men of other races, but we Americans place our futures in the hands of science and research. There are still, unborn, thousands of new products which will be made of sheet steel. They offer new business, new profit for the fabricator.

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Mention AMERICAN ARTISAN in your reply—Thank you!

Merchandise Mart, Chicago, and view of the Copper roof being installed. *Architect:* Graham, Anderson, Probst & White. *General Contractor:* John Griffiths & Sons Co. *Sheet Metal Contractor:* Harry C. Knisely Co. All of Ch'go.

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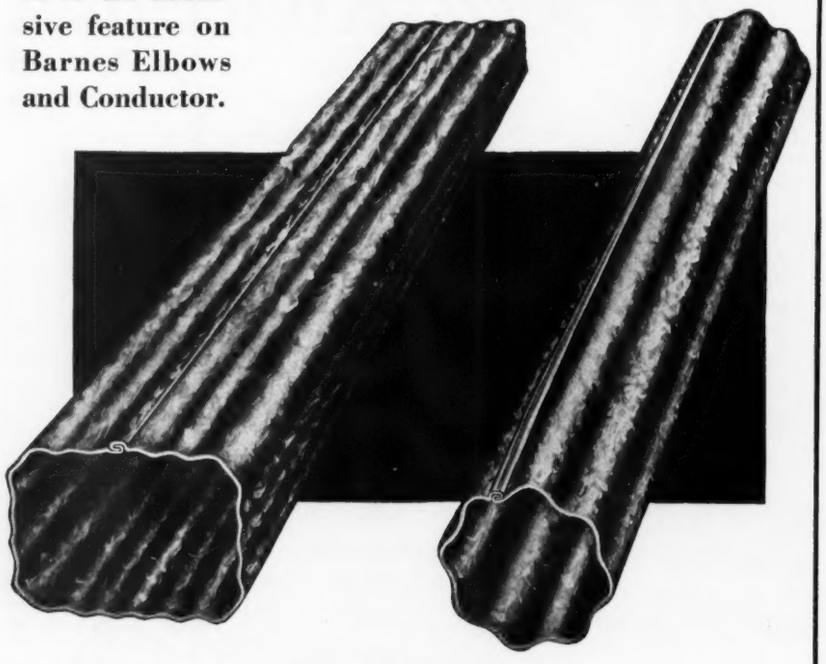

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VOLUME 101 AMERICAN ARTISAN NUMBER 5

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

Codes of Jurisdiction

WE have been impressed during the past few months with the increasing expressions of interest in sets of specifications defining the scope of sheet metal and furnace work. In most cases these requests have come from contractors actively promoting heating and sheet metal specifications to be incorporated in building codes.

There is, we feel, a necessity for adequate definitions of just what work the heating and sheet metal industries claim jurisdiction over. It was with much satisfaction, therefore, that we listened at the Indiana convention to just such a code formulated by the members of the heating and sheet metal industries of Ft. Wayne, Indiana.

This code of jurisdiction first became a necessity in Ft. Wayne when other crafts claimed work which should have gone to the heating or sheet metal contractor. As a result of this controversy, the members of the Ft. Wayne association were asked by city officials to prepare a code which would clearly define the scope of their work. The code which is published in this issue is the result of this work by the Ft. Wayne association.

That such a code is important is clearly indicated by the controversy between crafts desiring to throw metal work to their members. And, as in countless times past, most of these controversies have found every other craft but ours prepared to claim work for its members.

Perhaps this Ft. Wayne code is not embracing enough in its various sections. Perhaps there are some forms of sheet metal and furnace work which we should claim, but which have been overlooked. If so, then members of the industries everywhere should take enough interest in this code and give enough time to read its sections through carefully so that any such omissions can be righted. For this purpose we will gladly give space in AMERICAN ARTISAN to contractors desiring to express their opinion or offer their suggestions.

Undoubtedly this matter of jurisdiction has been festering for a good many years. Probably it remained for the restricted business times of the present to emphasize just how necessary such a code is. If so, then present conditions have served to properly focus attention on this subject.

With the renewal of good business, this matter of jurisdiction will be lost sight of in the scurry to place work. The present should, then, be a good time for every local association to get this code, or one like it, into the building ordinance of its local area. If the matter is let pass, it will be more difficult to get the code's provisions adopted when everyone is busy making money.

While the building boom was in full swing a few years ago, this matter of who shall apply special forms of metal work was a continual subject of argument. Much metal work which we should have done went to other crafts simply because we were not prepared to protect our rights. This situation should not be permitted to occur again.

The same situation will be felt in air conditioning work. At present just who is going to do air conditioning is a matter of some speculation. Without a doubt we will not be permitted to do this work uncontested. Other forms of heating will want to step in and take the profits they see in air conditioning.

One method of preventing this loss is through the type of code outlined by Ft. Wayne which shows that in the average air conditioning installation about two-thirds of the job consists of sheet metal fabrication and application. Regardless, then, of what type of heater is used for supply, the contract for the installation should go to the sheet metal man and not to the installer of one or two pieces of equipment.

We feel that if the Ft. Wayne code falls short in any one particular it is in this matter of air conditioning. This can be remedied and should be.

Unless we watch our step we will find that architects and owners will want to give the air conditioning specifications to some general contractor or engineer acting as a general. In order to make sure that the furnace man will not be a sub, as he has been for so many years on school house work, a code should make it clear that the sheet metal or furnace man is generally capable and authorized to take the contract.

The preparation and adoption into ordinances of such a code should offer associations a strong peg upon which to hang their arguments for membership.

A. O. Smith With

THE Research and Engineering building of the A. O. Smith Corporation in Milwaukee is classed in architectural circles as a building marking epochal changes in design and in sheet metal circles as a structure denoting limitless possibilities in the application of metal to modern type structures.

Architecturally, the building is an excellent example of how design, usage and engineering can be combined to give the utmost in utility without sacrifice of exterior beauty.

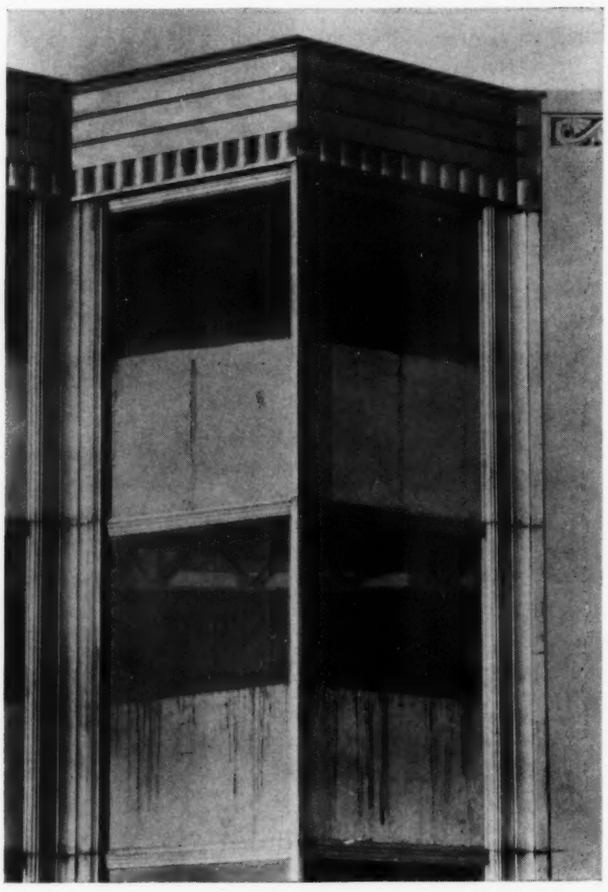
In planning the building, the Smith Corporation was concerned chiefly in getting more than the usual amount of daylight throughout all the floor areas. A U-shape was chosen as affording the most daylight for the ground area available. The corporation's business is based largely on engineering and research developments, which demand concentration and flexibility in shifting operations. The building, therefore, is designed with movable partitions throughout.

The exterior is entirely in keeping with this need for light and adjustable working conditions. Three sides, including the front, have exterior walls of metal and glass, formed in series of V-bays with just as little solid wall area as possible. Because the entire interior is air conditioned, all the windows are sealed and cannot be opened.

The V-shaped bays were selected because the designers felt that one V-bay would admit more light, with better distribution of the light passing through the glass than one flat window. In addition, this use of V-bays gives the three outside walls a highly interesting appearance. Three types of material are used on these sides—stone, metal and glass. The stone is used at the entrance, for the base and at the corners.

The use of metal and glass made it practicable to obtain a larger glass area than would have been possible with stone. In addition, metal and glass is lighter in curtain wall weight and also by using metal more artistic and greater flexibility in the construction was possible.

The metal used is aluminum chosen; first, for its light weight; second, because it is resistant to cor-

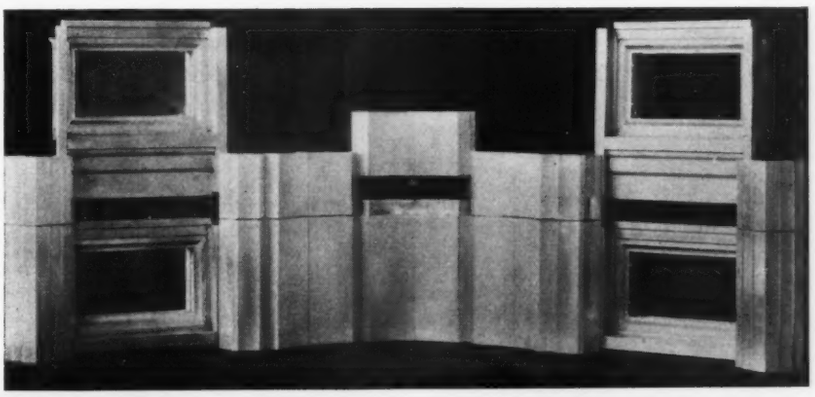


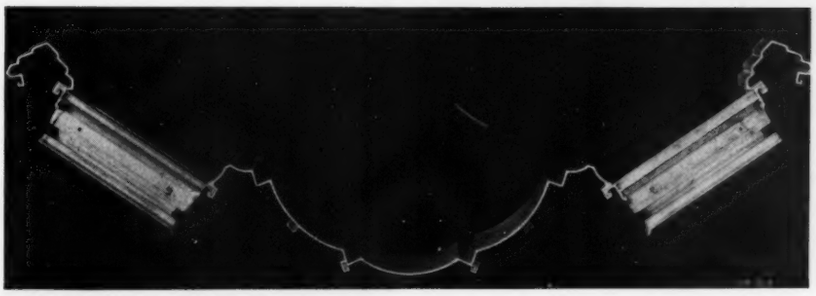
The V-bay windows are capped with a banded and fluted sheet aluminum cornice. All of the windows were fabricated from extruded aluminum shapes. These extruded shapes were cut to length, jig assembled and then welded into one continuous frame

Building, Forerunner of Structures Exteriors Formed of Glass and Metal

rosion; and third, because the color of the aluminum forms a pleasing contrast with the highly reflective plate glass.

Much of the metal was used in the formed extruded sections formed from sheets, but there is also considerable sheet metal work. In determining just how the metal and glass could be best combined and what forms would afford the greatest degree of flexibility and ease of erection, full scale models of all sections were first made in galvanized iron. These model sections were put together in several forms until one form was selected as best suited to the conditions presented.



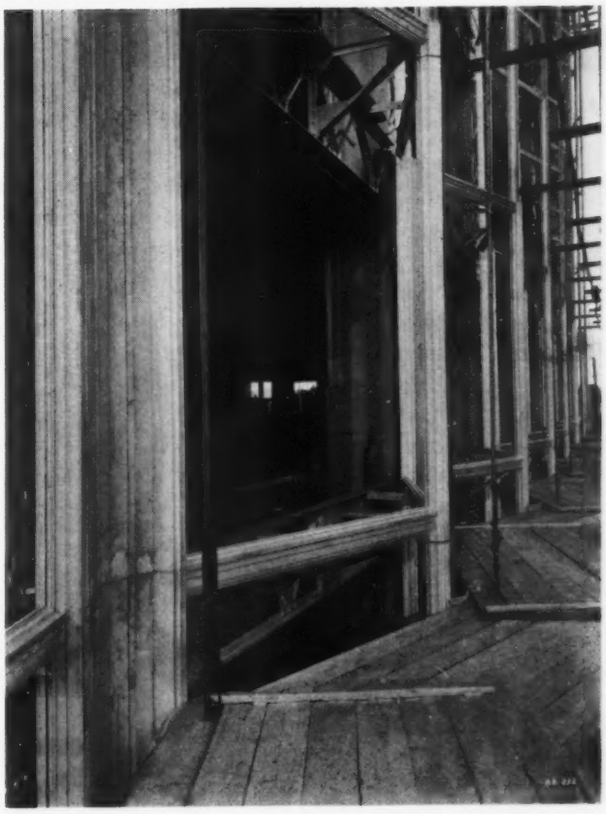


Cross section of pilaster showing the flush type locked lap joints. Lower illustration above: Vertical view of the cross section showing the expansion joints for the windows and pilaster sections

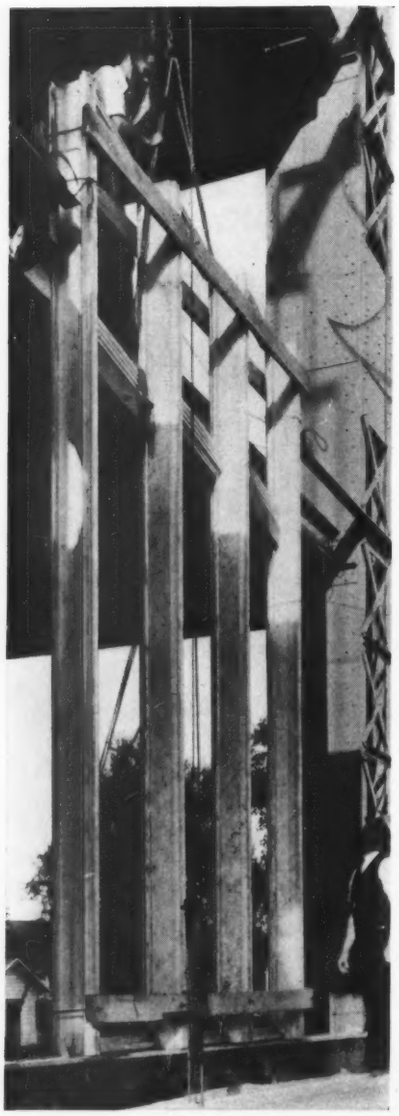
From the galvanized iron models the problems of joinery, welding, expansion, assembly, and erection were analyzed and solved, after which it became a simple problem to specify the metal in convenient lengths.

In general, the horizontal members are of an interlocking and overlapping design, provision being

Because of the limit as to the size of a member which can be extruded under present fabricating conditions, the development in the metal design involved a three-fold requirement. First, the forms to be created had to be simple enough so that each form could be sub-divided into smaller units to meet die requirements; second, they had to be designed so that the various units could be made of interlocking construction for ease of erection, weatherproofing and segregation of the window frame and sash from the adjacent metal areas; third, expansion joints had to be provided so that sufficient free action would be possible without detracting from the appearance.



Construction view showing the extruded V-bay windows and pilasters



Anchoring one of the triple windows

made for drips wherever possible. The vertical members, with the exception of the window frames, are of the butt joint type, provision being made for a continuous skirt on the top of each lower member, the skirt being continuously welded to the inside of the extruded member, thus forming a weathertight joint when the upper member was erected in place. These skirts were formed of No. 14 gauge aluminum and assumed the same profile as the extruded piece to which it was welded.

The extruded aluminum window frames were attached by means of aluminum bolts to 4 x 4 structural steel angle brackets welded to the steel plate floors. Each frame is hung from two brackets with four bolts holding the frame to the bracket. A piece of fiber serves as insulation between the aluminum frame and the bracket.

The window frames of the V-bays are joined on both the outside and the inside by means of a strip of extruded aluminum molding. Expansion and contraction in the vertical column of windows are taken care of by expansion joints at each floor level. Fluted aluminum pilasters connect the V-shaped columns of windows and form an integral part of the construction. The pilaster sections, which are 14 and 16 feet in length, are composed of six pieces of extruded aluminum molding held together by means of flush, locked-lap joints. As in the case of the window frames, an expansion joint is provided at each floor level. The weight of the pilaster section is carried on two structural steel column brackets fastened to the pilaster by means of three angle clips. Another set of column brackets and angle clips towards the top of each pilaster section holds the pilaster rigidly in place.

The 6-foot banded and fluted aluminum cornice follows the plan of the windows. This cornice was fabricated from No. 16 gauge sheet and erected in 11-foot sections, with each section carried on three 2 x 2 in. angle brackets fastened to the structural members at the head of the windows. Expansion in the cornice is provided for by connecting the lintel member of the windows to the soffit of the cornice. The cornice is capped with an aluminum sheet metal coping which covers the parapet wall and serves as a flashing for the built-up, precast cement tile roof.

Aluminum plinth blocks were employed for the water table. They were made by the sand casting process and set into the forms when the stone base was being manufactured. The result was a neat, waterproof, and easily maintained joint

(Continued on page 32)

Lowering a pilaster section into place. The expansion point is clearly visible

Method of anchoring an extruded aluminum pilaster section

Pattern for a Furnace Hood

By **W. R. HAINES**
Contributing Editor

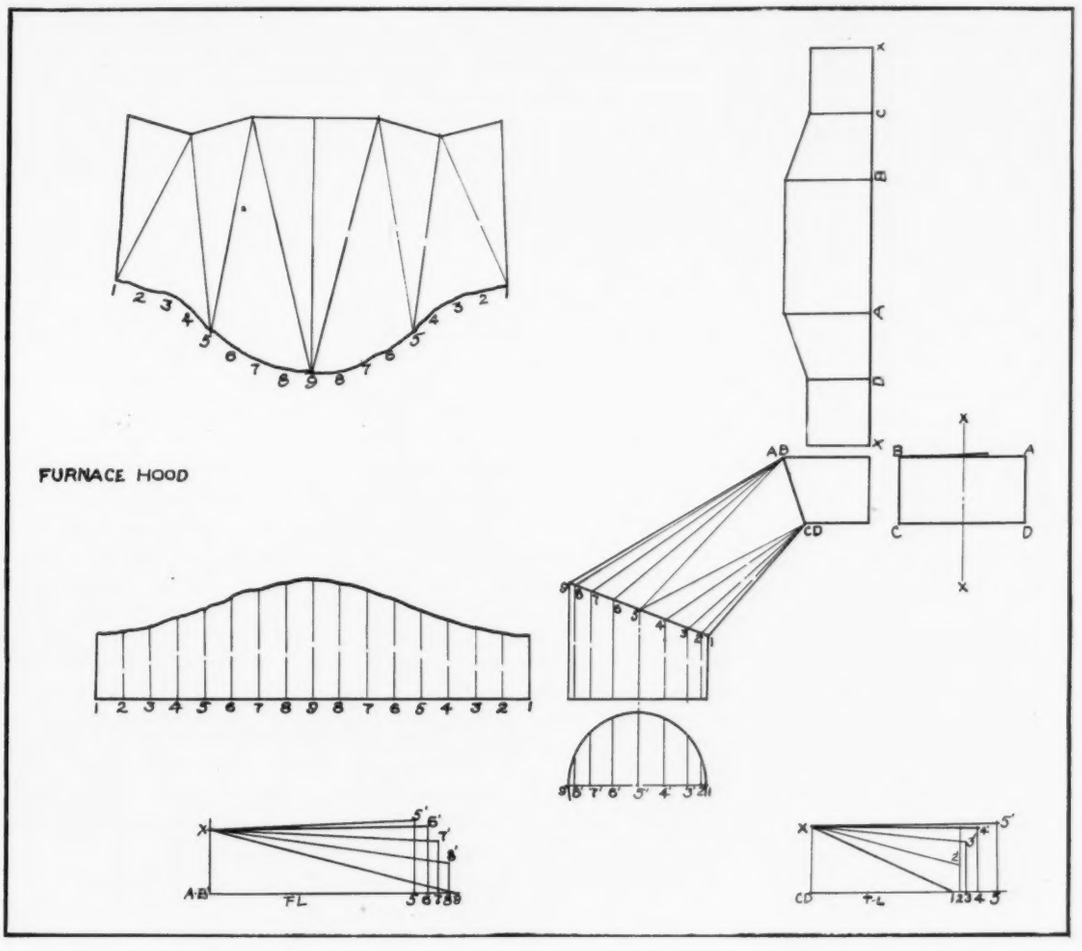
THIS pattern is published in answer to the request of a subscriber in Wisconsin. From the sketch submitted, I judged the furnace is to be used in heating an adjacent room on the same level, the entire heat volume to go into one rectangular register opening.

No measurements were given, so the distance from CD to 1 may be any desired distance, or the angle may be any pitch or given degree. Whatever the case, the layout will be the same. This fitting is known to the sheet metal trade as a transition elbow, but in this particular case it is a furnace hood.

In laying out this pattern, the first step is to draw your elevation and the rectangular end profile ABCD with X as the center line. Then draw the semicircle 1-9 of the plan. This is, of course, a full circle, but only half is shown on the plan. Divide this semi-circle into equal parts 1 to 9. Extend lines to intersect with mitre line on elevation. Determine stretch-out by circumference of furnace ring. Divide stretch-out into same number of equal parts as circle. Extend points 1, 2, 3, etc., on elevation to intersect points on stretch-out, making allowance for seams. This completes the first part of the pattern.

To develop the rectangular opening ABCD, project lines from elevation to stretch-out, which requires no explanation.

To develop the transition section, first determine the vertical height of your first triangle, which will be X to A or X to B. Next, the base line, which will be A or B to point 9 on elevation, which determines the first part of the pattern AB to 9. With dividers, from point 9 scribe points 8-8 on pattern. To find the true lengths of lines on pattern of transition section, first draw angle X-AB-9. Set dividers, for instance, to length of AB-8 on elevation. Then step off this same distance on base line AB-9, marking the point 8. Then square up, and draw vertical line 8 to 8′, using distance from 8 to 8′ on semicircle profile pattern. Then your distance from 8′ to X is the true length of lines A-8 and B-8 on pattern. Follow this same method to find true lengths of lines A-9, A-7, A-6, A-5, B-9, B-7, B-6, B-5. Draw angle X-CD-5 and proceed in same manner as explained above to find true lengths of lines C-1, C-2, C-3, C-4, C-5, D-5, D-4, D-3, D-2, and D-1.



A Code of Jurisdiction

THE rapid expansion of the sheet metal and warm air heating fields in the past two years has brought as one of the pressing problems the matter of just what work our contractors claim jurisdiction over.

In many communities where this matter has become pressing no basic code of jurisdiction on which to base claims has been available. The result is that much work which our trades should do is going to other crafts.

Just such a situation confronted the local sheet metal and furnace trades in Ft. Wayne, Indiana, where a building code was recently established. When it came time to allot work to the various crafts our contractors were asked to formulate a code which would outline in detail the work they were equipped and claimed right to do.

The code which follows was formulated in Ft. Wayne to meet this need. Doubtless the same code can well be applied to all other communities facing the same problem. This code of jurisdiction has been adopted by the Indiana State Assn. as a part of the by-laws. It has been presented to the Wisconsin Assn.

Section 1

We claim, herewith, for our members full jurisdiction over the manufacture, fabrication, assembling, erection, hanging, adjusting, installing, application, alteration, repairing, dismantling, reconditioning and maintenance of all sheet metal work of ten (10) gauge or lighter, said jurisdictional claim to include: flat, formed in brake, pressed, corrugated or ribbed sheets; rolled, drawn, pressed, stamped or spun shapes and forms of plain or protected steel, iron, tin, copper, brass, bronze, aluminum, zinc, lead, german silver, monel metal, stainless steel and any and all other alloy metals of ten (10) gauge or lighter; together with all necessary or specified reinforcements, brackets, hangers, straps, plates, tees, angles, channels, furrings, supports, anchors, clips, frames, ornaments, trimmings, grilles, registers, castings, hardware, plastic cements and mechanical equipment, regardless of gauge, weight or material when used in direct connection with or incidental to the manufacture, fabrication, assembling, erection, hanging, adjusting, installing, application, alteration, repairing, dismantling, reconditioning and maintenance of all sheet metal work of ten (10) gauge or lighter.

We also claim for our members full jurisdiction over the erection and fastening of any and all materials and work specified in this jurisdictional claim, whether same be applied to wood, steel, stone, brick, concrete or other types of structure or base, and likewise full jurisdiction over the making of all connections, attachments, seams and joints whether nailed, screwed, bolted, riveted, cemented, poured, wiped, soldered, brazed, welded or otherwise fastened and attached, and all drilling and tapping in connection with or incidental thereto.

Section 2

Any and all types of sheet metal foundation forms; wall forms; column forms; casings, mouldings; plain or corrugated domes; slab forms, ribbed or corrugated sheet forms used in connection with concrete or cement construction; including sheet metal inserts to provide specified openings, also permanent column guards.

Section 3

Any and all types of sheets, falat, formed in brake, corrugated or otherwise formed or reinforced; and all rolled, drawn, pressed or stamped sheets, shapes and forms of plain or protected metal specified for use in connection with or incidental to roofing, decking, folloring, siding, waterproofing, weatherproofing, fireproofing, for base and support of other materials, or for ornamental or other purposes.

Section 4

Any and all types of formed, rolled, drawn, stamped, or pressed sheet metal shingles, slate, concrete, asbestos or clay tile, sheet metal tile, sheet metal brick, sheet metal stone and sheet metal lumber, when specified for use as roofing, siding, waterproofing, weatherproofing, fireproofing or for ornamental or any other purpose.

Section 5

Any and all sheet metal work specified for use in connection with or incidental to steeples, domes, minarets, lookouts, dormers, louvres, ridges, copings, roofing, decking, hips, valleys, gutters, outlets, roof flanges, flashings, gravel stops, leader heads, downspouts, mansards, balustrades, skylights, cornice mouldings, columns, capitals, panels, pilasters, mullions, spandrels and any and all other shapes, forms and design of sheet metal work specified for use for waterproofing, weatherproofing, fireproofing, ornamental, decorative or display purposes, or as trim on exterior of buildings.

Section 6

Any and all types of sheet metal buildings including hangers, garages, service stations, commercial or storage buildings of permanent or portable design, whether manufactured, fabricated, or erected to meet specific requirements or whether constructed of standard patented units of flat, formed in brake, corrugated, rolled, drawn, or stamped sheets, shapes and forms of plain, protected or ornamental design.

Section 7

Any and all types of sheet metal marquise, vestibule and storm door enclosures, window frames, mouldings, cornice, pilasters, mullions, panels, sills, heads, awning covers, corner posts, stops, light troughts, reflectors and deflectors, bulletin boards and any and all types of sheet metal signs specified for use in connection with or incidental to display windows, building fronts, store fronts, and theatre fronts; for fireproofing, weatherproofing, waterproofing, ornamental or display advertising purposes.

Section 8

Any and all types of sheet metal bill boards, bulletin boards and sheet metal signs specified for use on the exterior of buildings for advertising and display purposes, and any and all types of sheet metal signs and bulletin boards specified for use in connection with or incidental to the equipment and operation of theatres, hotels, hospitals, apartments, factories and other types of buildings of interior or exterior design.

Section 9

Any and all sheet metal work used in connection with or incidental to the

equipment and operation of grain elevators, mills, factories, warehouses, manufacturing plants and commercial buildings, including elevator legs and enclosures, chutes, hoppers, carriers, spiral, automatic or other conveyors, package chutes, fire apparatus and enclosures for same, pipes and fittings, dampers, machine guards, cyclones, fans, blowers, dust collecting systems, ovens and driers, heating, ventilation and air conditioning, and all other types of sheet metal work and equipment, mechanical or otherwise, in connection with or incidental to the operation thereof.

Section 10

Any and all types of sheet metal window frames, sash, bucks, doors, frames, trim, picture moulding, frieze moulding, wire moulding, chair rail and base, panels, wainscoting, mullions, pilasters, sills, permanent vestibule partitions, smoke and fire screens, portable and permanent screens and partitions for hospital, office, commercial and factory use; toilet, shower and dressing room partitions; elevator and other types of enclosures specified for use as equipment and interior trim.

Section 11

Any and all types of sheet metal ceilings with cornices and mouldings of plain ornamental, enameled, glazed, or accoustic type; and any and all types of side walls, wainscoting of plain, ornamental, enameled, or glazed types, including sheet metal tile, and the application of all necessary wood or metal furring, plastic or other material, to which they are directly applied.

Section 12

Any and all moving picture booths and any and all sheet metal work in connection with indirect lighting systems, including side lights and foot lights in theatres, auditoriums, schools, etc.

Section 13

Any and all types of sheet metal work specified for use in connection with or incidental to direct, indirect or other types of heating, ventilating, air conditioning and ceiling systems; including risers, stacks, ducts, fittings, dampers, castings, recess boxes, outlets, exhausts, ventilators, frames, grilles, registers, fans and motors; air washers, filters, air brushes, housings, air conditioning chambers, unit heaters, cabinets, and any and all other sheet metal work and equipment, mechanical or otherwise, in connection with or incidental to the proper installation and operation of said systems, and all duct connection to and from same.

Section 14

Any and all types of warm air furnaces, including assembling and and setting-up of all cast iron parts, sheet metal hoods, casings, wall stacks, smoke pipes, trunk lines, cold air intakes, air chambers, vent pipes, frames, registers, dampers and regulating devices, and all other sheet metal work and equipment, mechanical or otherwise, in connection with or incidental to the proper installation and operation of same.

Section 15

Any and all types of sheet metal smoke pipe, elbows, fittings and breeching for boilers, heaters and furnaces. All sheet metal lagging and jackets on engines. Any and all sheet metal drip pans, exhaust pipes, heads, safety flues, and other appliances in connection with or incidental to boilers, heaters, furnaces, engines, machinery, etc.

Section 16

Any and all types of sheet metal furniture and equipment, lockers, shelving, library stacks, warehouse, factory and storage stacks, bins, etc., specified for use as equipment or incidental to the operation of offices, factories, libraries, hotels, apartments, schools, banks, public and semi-public buildings, and for general commercial use.

Section 17

Any and all sheet metal work in connection with or incidental to the equipment and operation of kitchens in hotels, restaurants, lunch rooms, drug stores, banks, dining cars, public and semi-public buildings, including ranges, canopies, steam tables, work tables, dishwashers, coffee urns, warming closets, sinks, drain boards, garbage chutes and incinerators, refrigerators and all other sheet metal work in connection with kitchen equipment or refrigerating plants.

Section 18

Any and all types of sheet metal work in connection with or incidental to laundry equipment and machinery, washers, clothes dryers, and laundry chutes.

Section 19

Any and all types of sheet metal work and coppersmith work in connection with or incidental to the manufacture, fabrication, assembling, maintenance and repair of automobiles, aeroplanes, pontoons, dirigibles, blimps, and other types of aircraft and equipment, and any and all types of aircraft hangars.

Section 20

Any and all types of sheet metal chandeliers, lamps and lighting fixtures, ornaments, decorations, household ware, and miscellaneous articles for use in factories and mills; any and all types of sheet metal switch boxes, cut-out boxes, panel boards, cabinets and speaking tubes.

Section 21

Any and all types of sheet metal badges, buttons and novelties with all hard or soft soldering in connection with same by flame or other method.

Section 22

Any and all types of sheet, tubing, pipes and fittings, used in connection with or incidental to coppersmithing work, regardless of gauge or material. The manufacture, fabrication, assembling, erection, maintenance, repair and dismantling of all said coppersmithing work, including the bending of tubes, pipes and coils and all pipe fitting in connection with or incidental thereto, and the testing of equipment with installed to insure proper operation.

Section 23

Any and all sheet metal work and coppersmithing work in connection with or incidental to building, maintenance and repair of ships and boats, including smoke stacks, life rafts, life buoys, crow's nests, switch and cut-out boxes, lagging on boilers and engines, lining of all partitions, paint and lamp lockers, refrigerating compartments, battery compartments, galleys and shower baths, ventilation and kitchen equipment.

You probably have played around with the idea of sizing ducts by the use of the friction chart. If so, you will be interested in Platte Overton's next article, to appear March 14, explaining just where the chart falls down and why use of the chart leads to trouble. Watch for this article—it is one of his best

Contractor's Experience With FAN CONTROL WIRING

IN connection with the survey made to determine typical practice in locating and establishing the temperature settings of fan controls, some interesting and informative data were also received on just how the thermostat, fan and bonnet control should be wired together for satisfactory operation.

While much of this data is fundamental and is probably supplied by the manufacturer of the control equipment, it may not be amiss to give some of the expressions of experience as found by these typical installers who have done experimenting as well as blind following.

We are able to show along with the reader's comments, diagrams showing typical hooking up practices as submitted by these contractors. It should be understood that these data were sent in late last year, and that many new units and considerable additional information has been established since then. However, for the benefit there is in these discussions of hookups we publish the material.

G. A. Voorhees

A most unusual reply, but typical of the thorough methods applied by Guy Voorhees in working out his heating problems, is contained in the reply he submitted to this question. Guy states:

"I find the most generally satisfactory method to be a control by means of casing thermostat only.

"If the fan is wired to start and stop with the burner, there is liable to be a complaint that when the fan starts, uncomfortably cool air is blown up into the rooms.

"With a thermostatic switch placed in the furnace hood or in one of the principal warm air leaders, the fan does not start until sufficiently long after the burner has ignited for the air in the furnace to become warm. When the burner cuts off, the fan continues to run until the furnace cools. This method gives very good satisfaction.

"If there is any pronounced tendency for the room temperature to 'override,' the casing control can be supplemented by a direct control which will stop the fan when the burner cuts out.

"The accompanying diagram indicates the complete cycle. In Fig. 1, the switch (B) which represents the burner control, and switch (C) representing the casing control, are both open. Neither the burner nor the fan is operating.

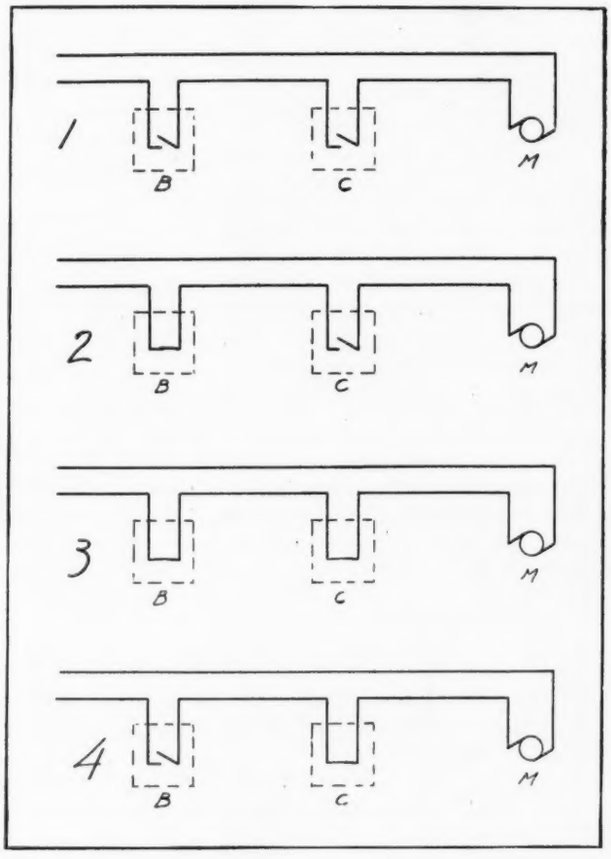
"In Fig. 2, the burner is operating and the switch (B) is closed, but as the air inside the furnace casing has not yet warmed sufficiently to make fan circulation effective, switch (C) remains open to prevent fan operation.

"After the air within the furnace has become properly heated, the thermostatic switch (C) in the furnace casing closes and the current is thus supplied to the fan motor (M) as indicated in Fig. 4.

"In Fig. 5 the burner has cut out, the burner switch (B) is opened and the electric current to the fan motor (M) is thus cut off, although the casing switch (C) is still closed.

"In such a case, with the fan and burner cutting out at the same time, a considerable amount of heat remains in the furnace. From the data published in Bulletin No. 141, University of Illinois Engineering Experiment Station, covering the temperatures of the heating surfaces of four types of furnaces at various combustion rates, it would seem to be a conservative estimate to call the temperature of an oil or gas fired furnace 500 deg. F. at the time the burner cuts out. Theoretically these surfaces would continue to give off heat until their temperature has lowered to that of the air passing through; practically they can be said to be giving off useful heat until they have cooled down to 250 or 300 deg. F.

"Taking the latter figure as being more conservative, we may say that after the burner ceases to operate the



The diagrams to the right illustrate the hookups discussed by Guy Voorhees. These diagrams are for a simple hookup for straight "on and off" cycle. The governing instrument is the bonnet stat. If this system "overrides" the house thermostat then an auxiliary stat must be used to shut off the fan with the heat supply

furnace can be cooled 200 degrees and the heat thus liberated can be usefully applied.

"The specific heat of cast iron and steel is approximately 0.12, which means that in cooling one degree, one pound of the metal gives up 0.12 B.t.u. Assuming that the heating elements of the furnace weigh only 1000 lbs., it is evident that for each degree of cooling. the heat liberated is $1000 \times 0.12 = 120$ B.t.u., and in cooling 200 degrees, the quantity of heat made available is $200 \times 120 = 24{,}000$ B.t.u. This is almost as much heat as two 12-inch pipes (according to the Standard Code) would deliver in one hour.

"With the relatively high cost of oil and gas fuel, that quantity of heat ought to be utilized if the plant is to operate as economically and efficiently as possible.

"It is true that even if the fan stops when the burner cuts out, and if there is no provision for gravity air flow, ALL of that heat is not wasted. A part of it finds its way as 'vagrant' heat into the house through warm chimney surfaces and in other ways mentioned in U. of I. Bulletin No. 189 (page 55)."

W. H. Sloan, Toledo

A hookup, adopted, we personally know, after a great deal of experimenting to make summer cooling possible with the same set of controls as used in winter heating has been developed by W. H. Sloan, of Toledo. A sketch showing his hookup is shown. Mr. Sloan says:

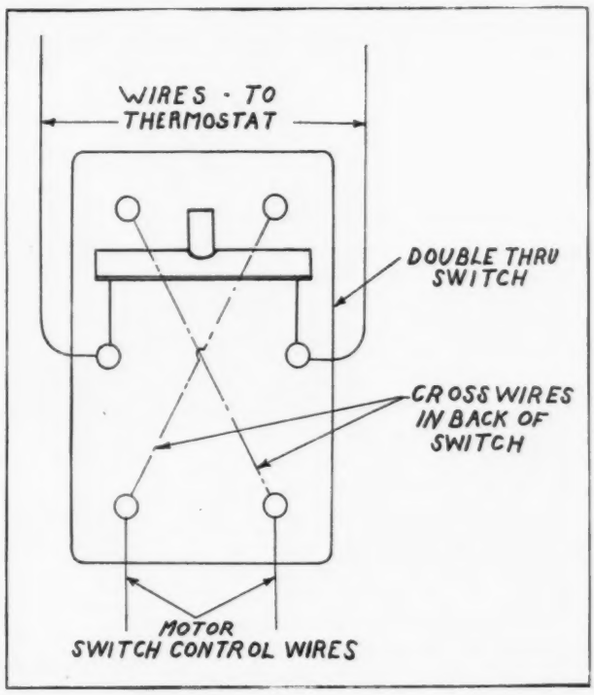
"It has been my experience that the blower should be controlled from a mercoid switch located in furnace bonnet, exclusively, during the heating season.

"By such a hookup, it is impossible for the blower ever to deliver cool or cold air at the registers.

"In my installations I set the switch to turn on blower when a temperature of 140 deg. has been reached in the bonnet and to shut down on reaching 100 deg. In this way it is only at the start that more than 125 deg. is ever delivered at the registers.

"In installations where there is no artificial means of cooling, I believe it is sometimes an advantage to have a switch conveniently located either on the first or second floors where the blower can be controlled manually in warm weather for the mechanical circulation of air.

"Where mechanical refrigeration is employed for cooling, I hook up the blower with the thermostat and the mechanical refrigeration, so that when



This is the wiring method used by W. H. Sloan developed to control summer fan operation as well as winter heating without disturbing any of the control wiring. The double throw switch shown changes the wiring from winter to summer

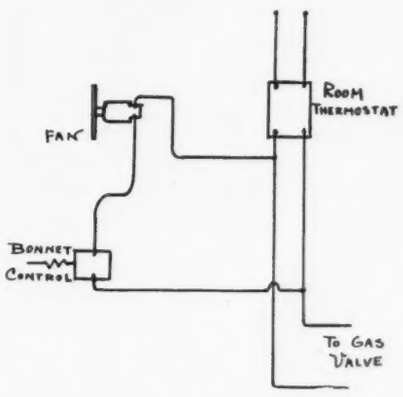
the house temperature raises above a predetermined point the thermostat automatically throws the plant in operation. I am enclosing a sketch showing my method for doing this without disturbing any of the wiring of the thermostat."

B. L. Schwartz, Pittsburgh

"The enclosed wiring diagram of a control setup for either an oil burner or gas furnace, illustrates the method we use in these cases.

"The type of furnace used enters prominently into the details of control. Where a steel or sheet iron furnace is used (reference only to the interior, not the casing), the operation should be as follows:

"The gas valve is opened when the room thermostat calls for heat. The



This hookup is used by B. L. Schwartz on his gas furnace installations. He does not recommend this for heavy cast furnaces for the temperature will override

fan, however, does not operate until a bonnet temperature of some fixed degree (usually 150 deg. F. with us) is reached. At this point the bonnet control or furnacestat makes contact and the fan starts to operate. When the house temperature raises sufficiently, the thermostat shuts the gas off; but the fan continues to turn over as long as the bonnet temperature stays above 135 deg. F. Below this setting the fan also stops and the entire system idles along until the thermostat again calls for heat. The cycle is then repeated.

"This setup differs from that used in cast iron furnaces in that the fan is shut off with the gas, instead of by the furnacestat or bonnet control. The starting of the fan is the same as in the first example.

"The fan must be shut off with the gas where heavy, cast iron interiors are used in order to prevent the house temperature from overriding. A good furnace of the cast iron type will store up from 50,000 to 150,000 B.t.u. during the 'on' period. Most of this heat will be forced into the house even after the gas is shut off, unless the fan goes off coincidentally with the gas. In such cases, the house temperature may go up from eight to ten degrees above that at which the thermostat shuts the gas off.

"This is not so prevalent with the light interior or sheet iron heater. In this type of unit, practically no heat storage is obtained, with an almost immediate and precipitate drop of bonnet temperature. Hence the bonnet control will stop the fan before any undue in-

crease in house temperature can be noticed.

"The practice of starting the fan with the gas is not considered good in view of the fact that cool air will be circulated before the furnace interior gets up to 1500 deg. F. Even though this air may be above 70 deg. F., it will feel quite cool because of the wind or breeze effect.

"In no case should the fan control be entirely independent of the furnace. Too much depends upon the occupants of the house for such operation. In fact, it is decidedly not practical to expect the housewife to be starting and stopping the fan as the gas comes on or goes off. And if the fan be left running all the time, cool air will be circulated during the 'off' periods of furnace operation.

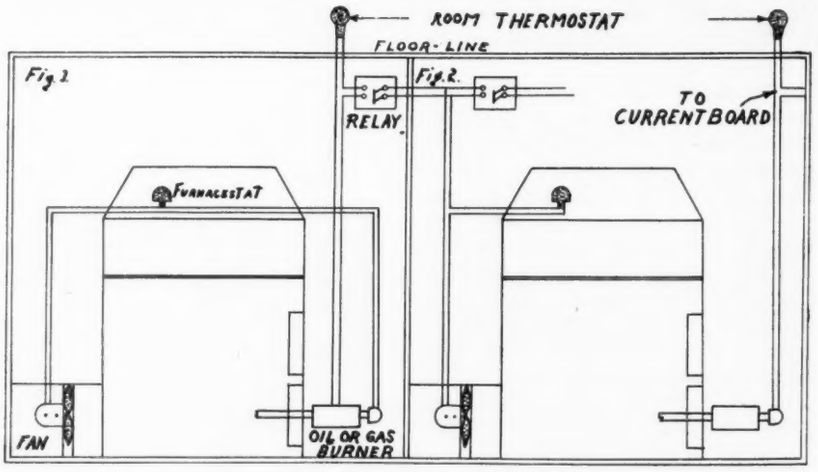
"This should not be confused with separate control switches for summer or ventilating fan operation. Our practice is to place a control button in the house at some convenient point. There is also a 'summer' and 'winter' switch in the basement. During the heating season the winter switch is turned on; and the fan is then operated entirely by the bonnet control regardless of the position of the control button in the house. In summer, the other basement switch is turned on, which permits the fan operation independently of the furnace fan switch."

B. F. John, Philadelphia

From the experience of several years' experimenting and installing both gravity and mechanical systems, and combinations of both, B. F. John, of Philadelphia, points out some of the hazards of following practices without knowing full well what principles lie behind the scenes. Mr. John says:

"A single circuit control can be made in a forced warm air re-circulating system for an oil or gas burner and a furnace fan, with room and bonnet thermostats, and will work; but, in practice, the fan is subject to the ills of the burner and in consequence this connection has proven unsatisfactory. When we consider the time spent in recalls, whenever an adjustment of the burner is made, it is more costly and annoying than if connected separately.

"To make the proper connection for this hookup, it usually requires the services of an experienced electrician (see Fig. 2), and he, in turn, must inquire from the manufacturer of the burner the nature of the wiring, as all are not alike. This expense, when compared with the cost of a separate connection made by the heating contractor himself, without awaiting the pleasure of the electrician, is excessive.



B. L. John's bonnet stat serves as a circuit breaker, preventing the fan throwing cold air into the room at the beginning of the cycle and keeping the fan running until all residue heat is out of the furnace. He declares the location of the bonnet stat is highly important

"The furnacestat placed in the bonnet of the furnace and connected to the main current and fan motor with the mercury column protected from the radiant heat of the furnace castings or shell, is much the better and cheaper plan and rarely requires any further attention, especially if the burner is installed by someone else.

"This furnacestat in the bonnet of the furnace is merely a circuit breaker and the only requirement is that it be attached to the main current of the house and the fan motor (see Fig. 1). This is easily done, as all the wires in this connection are alike. The thermostat then breaks or connects the current according to the temperature of the heated air currents in the casing, and that is all that is done even when the current is connected from the motor side of an oil or gas burner in a single circuit.

"There have been instances where the wiring was done so that the fan started and stopped at the same time as the gas or oil burner, but experience has shown that this method has defeated one of the most important purposes for which the fan was intended, namely, to save fuel.

"With a fan that allows both gravity and forced air circulation, the period of burning of the oil or gas burner is shortened materially; as the fan, while providing more than double the volume of air at a lower temperature, and thus more heat, while the burner is on, can provide heat as well after the burner stops. In consequence, the room thermostat thermometer may be set at a lower degree than otherwise. Also, for the additional reason that when the fan stops there is a gravity circulation at a lower speed picking up the heat units remaining in the casings and pipes and from the still partially heated castings or shell so that the temperature in the room is maintained for an additional length of time, with the result that there is a constant temperature at a minimum cost of fuel.

"Practice also teaches that care should be used in placing the bonnet thermostat properly because of the varying currents at different temperatures and velocity within the casing. Where possible, the furnacestat should be placed between two leaders of nearly the same size and to the same floor, where the flow of air is most constant, thus preventing the necessity of shifting the points set for starting and stopping, at varied outside temperatures, by the owner, which usually causes dissatisfaction and disappointment.

"Also, the bonnet thermostat should not be placed over the feeder neck of the furnace."

The Next Article in This Series Will Discuss "Air and Its Effect on Humans"

Metal Roofing Can Be Popularized

By
GEORGE F. HARTMAN

WHILE in some parts of the country, particularly the east and southeast, metal has and is enjoying popularity as a roofing material for residences, in other parts of the country metal went out of style many years ago and has only been revived within the past two or three years.

The trend to the use of metal by architects has been especially noticeable on residences of the larger and more costly type. Some of this architectural acceptance of metal is due, no doubt, to a growing interest in authenticity of style and combinations of materials to effect those styles. If, as many confidently expect, metal continues in popularity we may expect to see a great deal more of it used during the coming ten years than has been used heretofore.

Architects now say that there is growing acceptance of the fact that some architectural types are splendidly adapted to metal, while other types should not use metal.

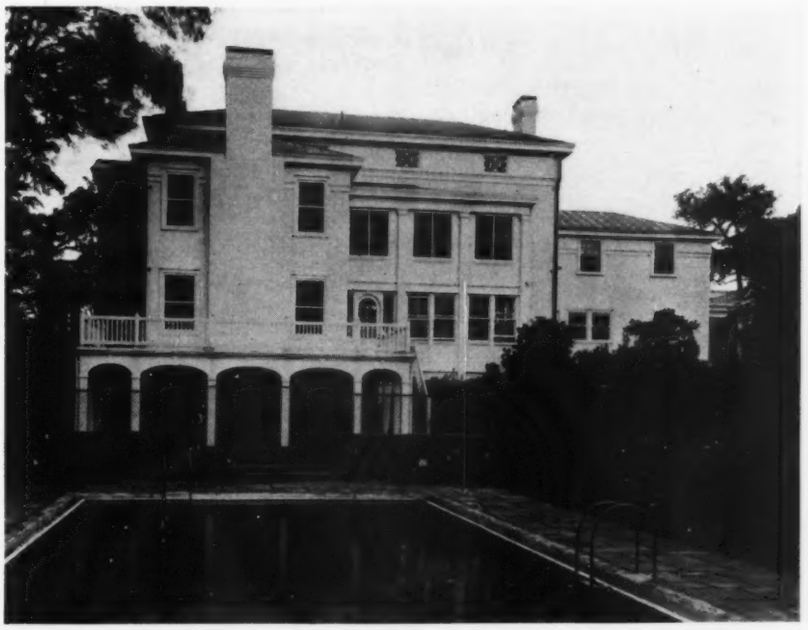
Still another phase of present day usage is the idea of painting the metal in harmonizing colors to blend with the other materials.

A splendid example of present day metal usage is the residence of R. Bruce Lindsay in Rochester, N. Y. The architect who designed this residence is J. Foster Warner, also of Rochester. Mr. Warner chose a terne roofing as best suited to the architectural type of the house and the materials in its construction.

The roofing contract was executed by George Ballard, Rochester roofer. One of the features of the installation is the use of a one-half inch layer of "insulite" over the roof sheathing boards. The metal was applied directly over this layer.

In laying the metal, the sheets were applied in sizes of 20 by 96 inches with a generous number of cleats on the edges. These cleats were nailed directly into the insulite. Forty-pound sheets were used. The long sheets eliminated numerous cross seams with a resulting neater and smoother appearance. Standing seams were used vertically.

The roof is painted a rich red to harmonize and also contrast with the cream colored stucco of the walls. In painting the metal the first coat consisted of Spanish oxide of iron mixed with pure boiled linseed oil to form a metallic paint which adheres and seals the metal. The finish coat is pigmented a rich red.



The view of the rear and of the front, above, show the attractive and harmonious appearance of this Follansbee Terne roof in the Lindsay home. Note the architectural effect gained by using standing seams. The roof is painted a rich red to contrast with the cream stucco

Have You Raised Your Percentage of Profit for 1932?

If You Have Not, Then You Are Bound to Lose Money Today Because Material Costs Are Going Down and Profits Go with Costs Unless You Raise Your Percentage Figure

By **JOSEPH G. DINGLE**

WHILE we may not be able to predict the definite end of the depression, we do know that it will end and most of us believe we shall find many of our old ideas thoroughly upset in the new conditions which will prevail. One thing will be that prices will be lower, for several years, at least. We must face this fact and determine just what it means to our particular business. The sooner we learn the facts and apply them the less money we shall lose.

On an advancing market, it is easy to make money. On a steady non-fluctuating market we can protect ourselves somewhat, but when commodities are dropping in price, we not only lose money through declining values of our merchandise, but through the fact that our expenses rarely decrease in direct proportion to the declining sales prices.

A sheet metal shop owner has sent in his figures showing the cost elements entering into his sales. They are quite interesting and will serve admirably to illustrate the effect of a declining material cost. We shall state them as they were for 1931, and assume a 10 per cent decline in material costs for 1932.

Direct labor	38.60%
Materials	30.80%
Overhead	30.60%
Total cost of sales	100.00%

Now, for convenience, let's assume that these costs were, in dollars, as follows:

Direct labor	$3,860.00
Materials	3,080.00
Overhead	3,060.00
Total cost	$10,000.00

It is, of course, understood that the sales price is based on cost—which includes the three elements—direct labor, material and overhead. We shall, therefore, discuss *cost only* in this article.

Assuming that our direct labor cost of $3,860 is required to use the materials which, in 1931, cost $3,080 and that our overhead expenses will remain stationary at $3,060, we can now build our 1932 costs as follows:

We would like to ask a number of our readers who have good cost figures for 1931, to send to us, or to Mr. Joseph G. Dingle, C.P.A., Ottawa, Illinois, their operating figures in order that he may prepare for our publication an analysis of the Sheet Metal Shop operations. Through use of correct and current figures, this analysis will be of much more value to our readers.—The Editor

Direct labor	$3,860.00
Material (90% of $3,080.00)	2,772.00
Overhead	3.060.00
Total cost—1932	$9,962.00

On a percentage basis, we now have:

Direct labor	39.82%
Material	28.60%
Overhead	31.58%
Total	100.00%

Now, to compare these figures: Instead of having a total cost of $10,000, we have only $9,692, a decrease of $308, all of which is in the material costs. This reduction in the cost of your material costs serves automatically to increase your direct labor and overhead costs. The percentages are:

	1931	1932	Change
Direct labor	38.60%	39.82%	I 1.22%
Material	30.80%	28.60%	D 2.20%
Overhead	30.60%	31.58%	I .98%
	100.00%	100.00%	

Direct labor has increased 1.22 per cent and overhead has increased .98 per cent, or a total increase of 2.20 per cent, while material has decreased 2.20 per cent.

Those shops who load their overhead on labor only can use the same percentage as heretofore, but with a lesser total cost through lower material content their profits will, of course, be less in dollars and cents by virtue of lower selling prices.

On the other hand, those shops

who have heretofore loaded overhead on MATERIAL AND DIRECT LABOR will have to *increase* their overhead percentages. While for 1931 this percentage was 44.03 per cent, in 1932, the figure should be 46.15 per cent—an increase of 2.12 per cent in the overhead percentage in its relation to cost of MATERIAL AND LABOR.

Now, even though the sheet metal shop recognizes these changed conditions, there remains the matter of selling price—which, as we know, is based on cost—material, direct labor and overhead. Let's now take a look at these two sets of figures and see what our selling prices are. Let's say we want to make 15 per cent profit on our costs.

Our cost for 1931 was	**$10,000.00**
Add 15% profit	**1,500.00**
Sales price for 1931	**$11,500.00**
Our cost for 1932 is	**$ 9,692.00**
Add 15% profit	**1,453.80**
Sales price for 1932	**$11,145.80**

Thus, using the same direct labor, the same material but at 10 per cent less cost, and the same overhead, we have—not a selling price of $11,500, but $11,145.80—just $354.20 less sales price. Where we added $1,500 for profit in 1931 we now add only $1,453.80, or $46.20 less.

While our materials cost us $308 less than in 1931, we have, even though we thought we had corrected our basis for pricing our work, giving our customers all of this $308 saving in materials and ALSO $46.20 of our profit. We have sold for $11,145.80 what would have, in 1931, sold for $11,500. While we have apparently corrected our sights, we have given a part of our reasonable profit to our customer and did not know it. We have given the customer slightly more than 3 per cent of our profit.

Now let's restate our transactions in compact form—side by side—and see how they look, Table I:

Thus we show that the shop owner who KNOWS HIS COSTS and applies them is going to suffer a loss of a part of his profits, unless he increases also his percentage of profit as added to his costs. With a lower cost he will, naturally, have lower profits if he uses his old percentage of profits in pricing his sales.

To the dealer who does not know his costs, but does know that his materials have declined in price 10 per cent and lets the matter end there, we can but say that he is in a bad way and will not pass on to his customer the full cost of his work—to say nothing of getting a profit for himself.

While it has been necessary for all business men to know their costs, with the present conditions before us we must know our prior costs and KNOW HOW TO USE THOSE COSTS IN MEETING PRESENT-DAY PROBLEMS.

TABLE I

Sales		**$11,500.00**		**$11,145.80**
Cost				
Direct labor	**$3,860.00**		**$3,860.00**	
Materials	**3,080.00**		**2,772.00**	
Overhead	**3,060.00**		**3,060.00**	
Total cost		**$10,000.00**		**$ 9,692.00**
Profit		**$ 1,500.00**		**$ 1,453.80**

A Practical Welding Rigging for Heavy Sections

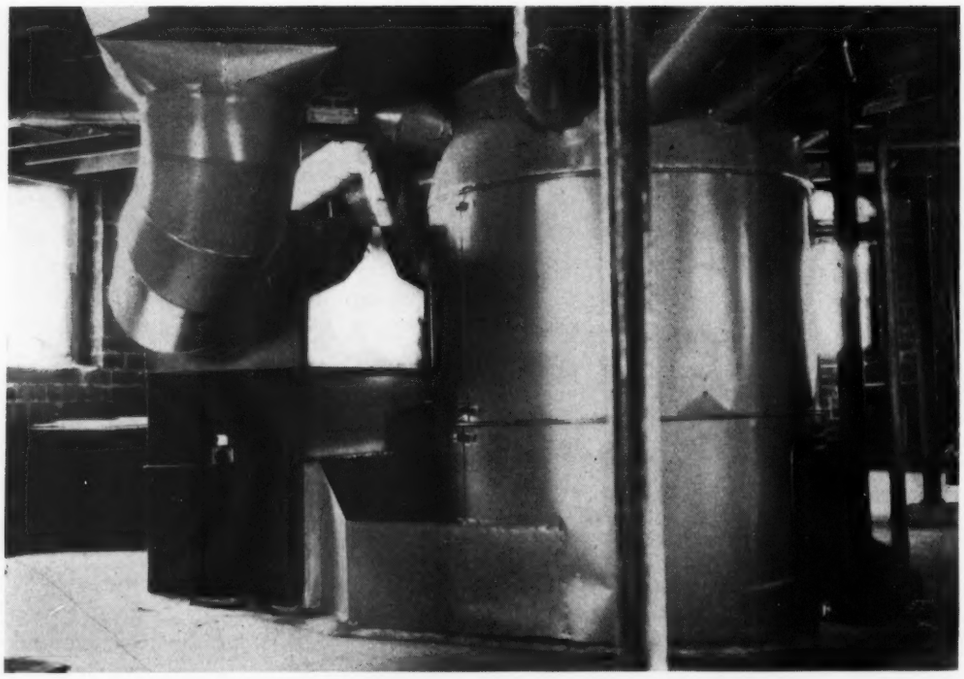
SHOPS doing spot and seam welding often have welding operations slowed down through difficulty in keeping the work advancing smoothly under the contacts. This slowing down is especially troublesome where sections of heavy, angle-reinforced ducts are going through the machine to have the angles spotted.

In the shop of the Matthews Conveyor Company a special rigging as shown was designed to eliminate all the tugging and pulling ordinarily required to get heavy sections through the jaws.

The system used employs the adjustable horses shown to support at the top a small channel in which roller bearing wheels of the track run. These channels permit the whole conveyor holding the section being worked on to be moved in or out of the jaws at a touch of the hand.

Movement through the jaws from side to side is by means of the large rollers on which the piece rolls along.

This picture shows the special horses with their track and the roller track on which the section to be welded moves through the contacts



This furnace is finished in distinctive light green enamel. Adolph Munkel, Columbus, Ohio, did the job and uses this shade of green to mark all his work

Looking for a sales idea?

CONSIDER PAINTING

ARE you interested in a small cost service which makes it easy to get into the basement?

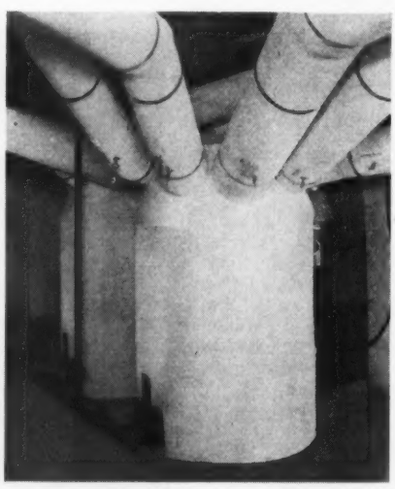
If you are, then give some thought to the possibilities of painting old furnaces.

This simple scheme has been tried quietly by a number of furnace contractors in various cities and in spite of depressed conditions has been found by them to be a sales plan which meets with astonishing success.

This painting plan does not mean the old method of daubing up the front casting and perhaps knocking a few ounces of dirt off the leader pipes. If you charge for that operation as a part of your cleaning service, very well, but you can't sell such a service, for it does not make the basement any more attractive.

And don't forget — Attractive basements are the desire of all housewives these days.

Here is the outline of the work these contractors agree to do:



This is a insulated casing and pipe job with all the insulating material painted with everyday white enamel

First—Paint the front casting in some dark color—black, navy blue, dull red, dark green.

Second — Paint the galvanized iron casing all around in some lighter color—dark yellow, light blue, bright red, grey, aluminum, light green, cream.

Third — Trim the casing with contrasting colors or more often in the same color as the casting. Most contractors trim the frame if the frame shows in a square cased job, or perhaps the top and bottom casing ring if the casing is round.

Fourth—In rectangular ducts paint the ducts from end to end of the basement. If the leaders are round pipe, either paint the pipes or recover with clean asbestos paper. Paint the damper handles and rods in a contrasting color.

Fifth—Paint all connecting water pipes and fuel lines if the plant is

automatic.

Sixth—If return runs are free pipe, paint these or cover them for appearance with asbestos. If the returns are between joists, paint the iron bottom.

Seventh—If the system is forced air, repaint the accessories, fan, washer, filter box, etc., either to contrast or match the furnace. Which color to use depends on the preference of the owner.

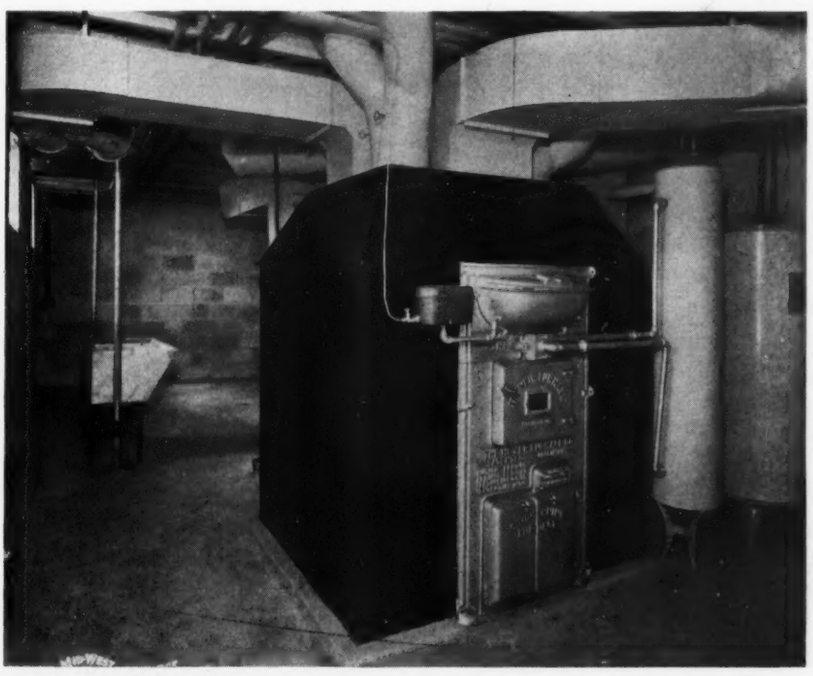
Eighth—Recommend some improvement in the smoke pipe. If it is a long run, dirty and rusty, paint with heat resisting enamel or paint —or sell a new length of pipe.

Of course you want to know how much profit there is in a job of this kind. And naturally this cannot be answered without qualifications, due to varying conditions.

One contractor who does only big stuff reports this—"I employ ordinary enamels on my jobs. Most of the work I solicited last summer is for gas-fired heaters in good homes. I have not had to go to the expense of using heat resisting enamels, though I don't believe the difference in cost to me would be noticeable. I hire a union painter and pay union wages because I have found that a good painter will do a much better job than 'pick-up' help and appearance is what I am selling. My books show that last summer my average painting job required one and one-half days. This average was lengthened because of the fact that I did a surprising number of 'crackle' enamel jobs where I had to let the paint set with heat before I could trim.

The contractor who painted this furnace left the crimped return bare to mark the cold side from the hot. The casing is enameled. The pipes are covered with asbestos paper

"The painter's wage was $9.60 a day, so the average labor cost was $14.40. Taking into account all kinds of paints used, my average material cost was just under $10. My mark-up for profit has been based on both labor and material in order to effect a balance between jobs having about equal labor and material cost and jobs having much labor, but little material."



The Midwest Heating Co., Indianapolis, painted this beautiful installation in contrasting dark casing and light ducts. The material is heat resisting semi-gloss paint. Application is by brush

At the other end of the range of work being done by contractors who have found painting profitable, is a contractor who has more or less specialized in the small sized, gravity, round pipe installation usually several years old. This contractor's comments contain a number of interesting points which we repeat. He says:

"Most of my painting jobs have been on the usual gravity type furnace, having round pipe leaders and between-joist returns. Many of these furnaces have had the front casting painted one or more times, often by the home owner. These past paintings have been more or less botch jobs and I have made it a point to remove all old paint from the front casting before I apply my paint.

"In most instances the leaders have been cased in asbestos paper

which is usually loose and torn in spots. These spots are nearly always rusty.

"With these considerations in mind I sell a painting job on three ideas which I do not find difficult to explain to the owner.

"First, I agree to clean and repaint in first class manner the front casting. Second, I agree to remove all old asbestos paper and clean the rusty spots. I then give the owner the choice of fresh paper or complete painting of the leaders. Third, I agree to paint the casing in any agreeable selection of two colors and guarantee the paint job for one heating season.

"You might be interested to know that before I make this last guarantee I inspect the casing to see if there is a liner in place and that it is in whole condition. My reason is, of course, to be sure that I won't have intensely hot casing spots from heat going through a liner hole. If there isn't a liner in the casing I have always been able to sell the owner a new liner and this is a really profitable job.

"Last summer I solicited these painting jobs myself. To be truthful, I was surprised how easy it was to sell this service to the housewife. The reason probably lies in the fact that every housewife is sick and tired of the average dirty, dingy basement and sees her painted furnace as a heating unit just like the very beautiful affairs we see in every household magazine.

"After the first two weeks I got enough painting orders ahead to keep a painting crew composed of two men, mechanic and a helper, busy all summer. This crew followed me up house by house so that I was able to get the job done before the owner had a chance to change his or her mind.

"After a very few jobs we perfected our operations so that removal of old paper, for instance, was accomplished without too much muss in less than one hour. Cleaning required perhaps another hour and was done by the helper, while the mechanic either painted the leader or repapered them. By the time this was done, the front had been cleaned and was ready for paint. Also the casing. Both helper and mechanic painted here, usually the mechanic doing the trim work while the helper painted the larger areas.

"My records show that the average job took just about one half day. The labor cost for the crew for one-half day was $6 and the materials $4. With my profit this brought the average selling price last summer to $15.

"Say what you will, I think this painting campaign proved the best business builder I ever used. I admit that part of its success was due to the fact that I was the only heating man offering this complete service.

"I might confess, also, that this painting work has given me the first and best chance to get repair and replacement business among the owners I get in touch with. As a result of this entree I have done a really profitable amount of work in repairs and replacements that unquestionably I would not have secured otherwise."

This small home plant is covered all over with aluminum paint—casing, leaders, returns—even the water heater. The result is a heating unit which compels the owner to keep his basement in apple-pie neatness

In between these two types of contractors is a host of other furnace men who use painting as a means of getting business. The success they have had with this "profit maker" in times of poor business indicate that painting is a first class way to make money.

Just a word regarding materials. The tabulation shows that most contractors use heat resisting paints and enamels, mostly applied as one coat over clean surfaces in order to avoid any possibility of burning because of heat. On mechanical systems where cool casings are the rule, ordinary enamels, duccos and paints are being used successfully. Most of the contractors are applying these materials with a brush, but a few are using small power spray machines.

This painting has proved to be, in the hands of contractors willing to ring door bells or send out solicitors, an uncrowded field of solicitation. It has proved profitable, also. Best of all, it fits exactly into the picture of pretty basements which seem to be the aim and desire of every home owner. Proof of this comes from the last quoted contractor who says, "It's a funny thing, but call-backs on my jobs show that in about 65 per cent of the houses painting the furnace has resulted in the general dressing and painting up of the whole basement."

. . . the problem corner

TWO ROOMS WON'T HEAT

IN the January 18 issue, we presented a problem in heating two rooms where return air is badly cut off and where an air-bound condition evidently exists. Quite a number of replies, some of them real engineering analyses of the situation, were sent us by readers.

In brief the problem was this—

"We had trouble with heating two rooms—the servant's on the second floor and the kitchen on the first.

We heated the servant's room by venting to the attic, which relieved the air-bound condition. But, our customer will not leave the doors open leading from the kitchen to the nearest cold air return.

"We wanted to take air from the kitchen, where the warm air register is now located, and connect to the bottom of the furnace, and place a new warm air register next to the second floor riser; but our customer objected because he does not want kitchen odors to permeate the atmosphere of the rest of the house. We were to do this without cost to our customer, but, since he refuses, he must pay for any other method of relieving the air-bound condition.

"You will note that we have a possible solution drawn on the first floor plan of the sketch. We propose to use some type of individual pipe run booster inserted in an 8-in. or a 9-in. pipe raised from the floor a few inches and connected to the old kitchen range flue, thus exhausting air from the kitchen. Then the warmed air should come through the warm air duct. Our theory is that not only will the kitchen heat adequately, but that it will eliminate any and all kitchen odors getting into the rest of the house.

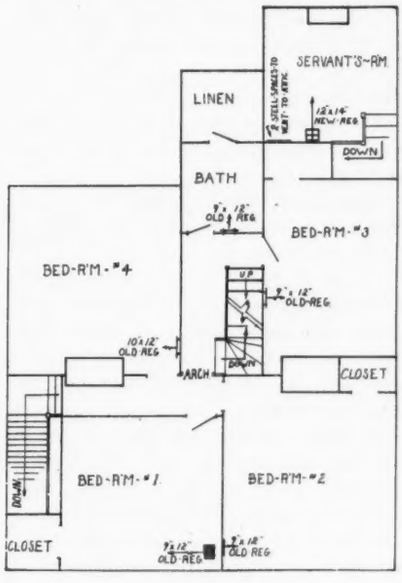
"If some of your readers have had experience with individual pipe run booster fans we would like to know whether or not they think such a fan placed in the flue mentioned would exhaust the air from the kitchen into the outside."

G. A. Voorhees, Indianapolis

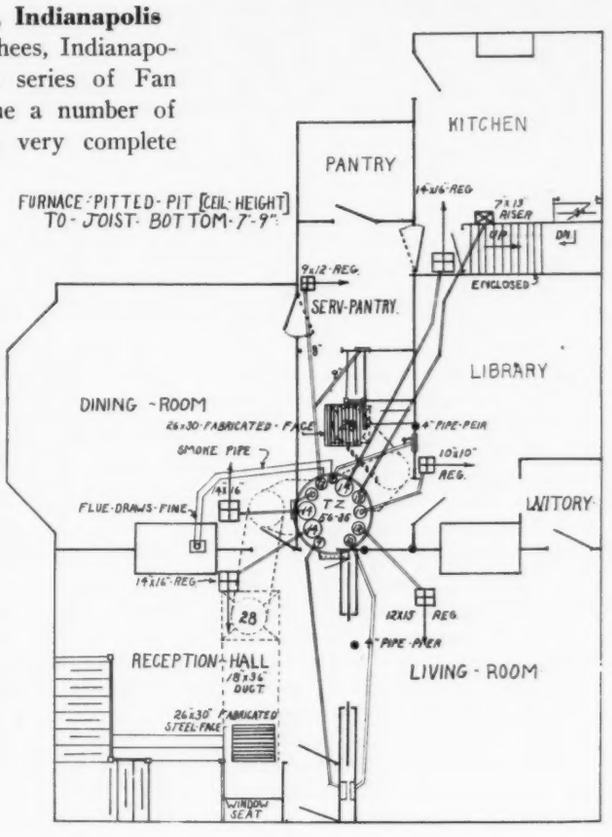
From Guy Voorhees, Indianapolis, author of the series of Fan Fundamentals, come a number of suggestions and a very complete analysis of the trouble. Guy says:

"When a chimney is used as a vent flue its draft is not nearly so strong as when used for smoke. The reason is that the intensity of draft depends upon the *difference* between the weight of the column of hot gas or warm air within the flue and the weight of an equal column of outside air. Therefore the hotter the smoke within the chimney or the colder the outdoor air, the stronger the draft. That's why a chimney flue draws better in snappy, cold weather than on a mild day.

"It also explains why an outside flue doesn't draw as well as one built wholly within the house. The walls of an outside flue become chilled and this in turn reduces the temperature of the smoke so that the *difference* between the temperature of the smoke



At the left is the second floor layout. Poor heating of the servant's room has been overcome by venting the air bound room into the attic At the right is the present layout of the kitchen. The nearest cold air is beyond a door which the owner refuses to let stay open. There is an old flue which may be used to exhaust air. How would you heat this kitchen without recirculating its air through the furnace? The kitchen is 13 x 18 x 11 feet high



and that of the outside air likewise is reduced and the "suction" of the chimney is lessened.

"We find that this materially affects the draft in a smoke flue where the smoke enters the base of the chimney at a temperature ranging from about 250 degrees Fahr. up to 400 or 500 degrees Fahr. It will affect a vent flue even more, because the vented air enters the flue at about 65 degrees and even a very slight chilling within the

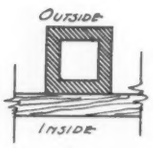


Fig. 1

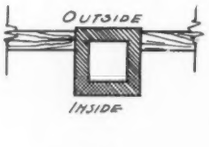


Fig. 2

flue will bring the air temperature within the chimney down so near to outside air temperature as to almost destroy the aspirating effect.

"Thus a chimney flue like that shown in Fig. 1 is liable to be quite unsatisfactory as a cold air vent because it is subjected to chilling on three sides. Fig. 2 is much better because only one side of the flue is being directly cooled

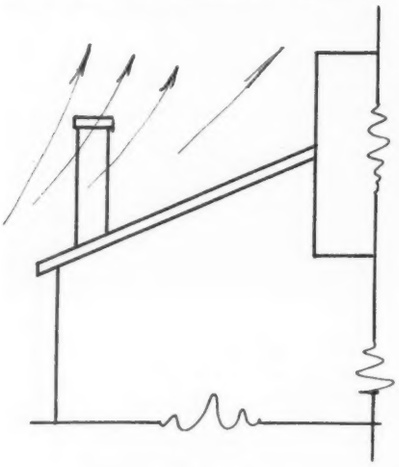


Fig. 4

If the chimney top is below the ridge, the chimney will draw all right so long as the wind is from the chimney side or parallel to the ridge

by the outdoor air. Fig. 3 is still better.

"The foregoing considers only 'natural' draft; that is to say, the draft due to temperature difference. There's another effect that is equally important; namely, wind conditions. Fig. 4 shows a condition where there will be an upward flow of smoke or air up the chimney regardless of temperature, and almost any vent flue will work well under such conditions. But the wind direction may change and we have the condition shown in Fig. 5

where there will be a downward flow in the flue.

"So much for the flue itself. Now suppose that the flue can be used as a vent, can we be sure that this will remedy the present heating trouble? If the kitchen happens to be on the windward side of the house, and if the windows are not well fitted, it is easily possible for the infiltration of outside cold air to provide ample air to supply the vent flue and at the same time kill

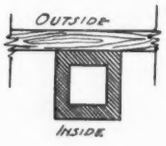


Fig. 3.

Here are three common types of chimneys rated from left to right in order of their preference

the delivery of warm air through the register (Fig. 6).

"Because of such a condition, which is not only a theoretical possibility but is too often encountered in remedying an actual trouble job, it is safer

Room vents will work 12 months a year if the contractor will install both floor and ceiling registers. Use the floor opening in winter and the ceiling in summer. Here is a typical installation

to add an individual pipe booster to the warm air run supplying the room. A customer who has had real or imaginary trouble in heating a room is liable to be quite critical, and it's much

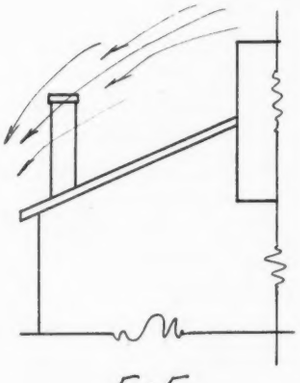
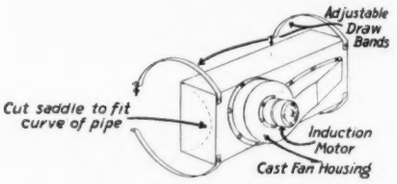


Fig. 5

When the wind is off the ridge, down-drafts may be expected in the chimney and the chimney's "pull" will be reversed

safer to take particular care to insure that the first remedy applied shall be fully successful.

"A fan attached to the vent flue *might*, and sometimes does, make trouble by increasing the infiltration of cold outside air through cracks



This is a typical single run booster fan. For all conditions of trouble, this unit keeps air moving through the leader

around windows and doors. Applied to the warm air leader, it is directly driving warm air to the room, and, after all, that's what we're after.

"I happen to know that the manufacturers of the furnace used on this job have been testing out a very sim-

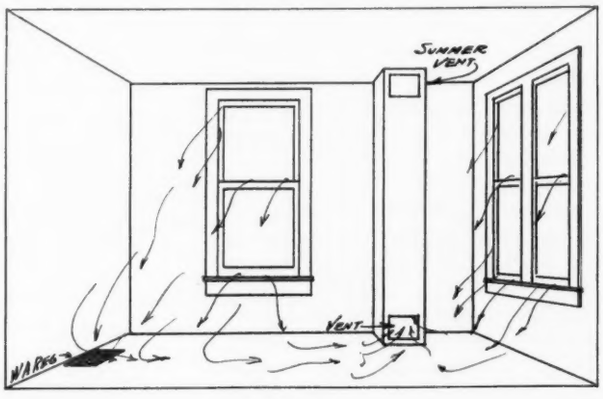


Fig. 6

ple type of booster fan which is well adapted to use on a job like this. This booster (Fig. 7) is easily attached to the warm air leader. Merely cut a hole in the side of the pipe anad attach the booster by means of a couple of adjustable draw bands. No part of it extends into the pipe to interfere with gravity flow when the fan is not running.

"On a job like this, where one of the rooms being vented is heated by a 14-in. warm air pipe and one by a 12-in. pipe, a considerable quantity of air is being removed from the house each hour, and consequently an equal volume of outside air must enter the building to replace that removed by the vent flues.

"Unless special provision is made for introducing fresh air, the inward leakage of air on the windward side of the building through cracks around windows and outside doors will be greatly increased to replace the vented

air. This increase in infiltration may reach the point where it causes annoying cold drafts on the floors in some rooms. It's better to avoid this possible source of trouble by running a fresh air pipe directly from an opening at some convenient point in the foundation to the base of the furnace (or it may be tapped into one of the present return air ducts).

"When a chimney flue is used for a vent, most customers are pleased if the heating contractor suggests vent registers at both the top and base of the flue within the room. The bottom vent is used in winter, and in summer it is closed and the vent register at the ceiling line opened (Fig. 6)."

B. F. John, Philadelphia

B. F. John, a close student of warm air heating and one of the best known heating men in the East, sends the following:

"If the old range flue in kitchen is not used for anything except possibly a vent from gas range or gas hot water heater, the simplest method to relieve the pressure in the kitchen, in our experience, is to place a register with louvres and open and shut cords within reach of the floor to operate it, at about 10 or 12 in. from the ceiling; in this chimney face with a tin box through the brick work fastened to hold the register.

"Returns should never be taken from kitchens, baths, doctors' offices or waiting rooms or other rooms of a like nature, but be vented to attic or outdoors, with at least 50 per cent added heat to take care of the ventilation.

"A booster fan naturally would help the chimney draft, if for some reason the chimney does not draw sufficient heated air and cooking fumes from the kitchen. The heated air at the kitchen ceiling is usually 90 to 95 degrees F. and is sufficient to warm the average flue, we have found.

Side wall heat registers, especially baseboard, are much more efficient on the first floor, as the opening of doors checks the floor registers and chills the heat piping, and the recovery is slow in a gravity job.

"If for some reason the chimney cannot be used at the ceiling, then we have placed a register in the ceiling of the room and a whirl ventilator or tee cap ventilator on the roof, depending on the amount of ventilation required; placing the roof ventilator as far as possible away from the ceiling register, but in the same joist space, if there is no larger space between ceiling and roof. The plan submitted shows the kitchen to be one-story.

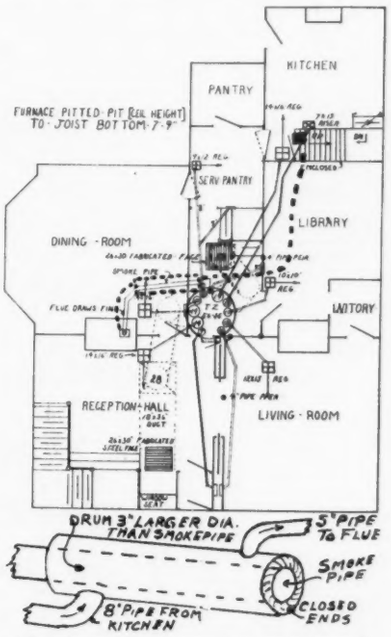
"As there is only 2574 cu. ft. in the kitchen, there is little doubt but that the chimney method would be preferable, if practical.

"Venting at the floor line, we have found to be too slow, due to the cold air strata; that is, unless the opening is quite large and unsightly. Only heavy grease fumes, as in restaurant kitchens, drop to the floor and require fan assistance. The average house kitchen smoke and odor from cooking rise to the ceiling.

"A canopy over the range, connected to the chimney near the ceiling, with a damper in the pipe, is still another method of venting for both odor and heat, and often quite effective."

Gilbert Olson, Omaha

Last year at the National Warm Air Heating Association meeting in Columbus, Gilbert Olson was introduced as a young man who knows his heating from A to Z, and the address he delivered certainly made the "old-timers" sit up and take notice. He suggests the following as a solution:



This interesting gravity ventilator is suggested by Gilbert Olson. It vents the room through natural forces, utilizing the pull of heated air from around the smoke pipe plus the pull of the chimney

"To me, this problem is comparatively simple, due to the fact that this home happens to have one of the few conditions that are favorable to a good draft; namely, an inside chimney. I note that the remarks indicate that the flue draws fine.

"My suggestion is, in order to have a strictly non-mechanical ventilation of this kitchen, some gravity motive power must be arranged for. I would suggest the installation of a drum around the smoke pipe, at least between the first two elbows which connect the longest straight pipe of smoke pipe, the end which is nearest the chimney to be fitted with a 5-in. pipe connected directly into the flue above the smoke pipe entrance into the chimney, the other end of the smoke pipe jacket or tube to be connected with an 8-in. pipe to a new register located in the floor of the center of the door leading to the second floor servant's room. This will allow half of the register to be protruding past the door in the kitchen and the other half would be at the foot of the stairs. This would allow relief of the air condition from the servant's room which would naturally drop down the stairway and be caught at the base of the stairs; at the same time this allows plenty of air to be taken from the kitchen.

"I am enclosing a sketch outlining how the problem should be handled."

E. Van Spyker, Holland, Mich.

A very brief but to the point suggestion was sent in by E. Van Spyker, who conducts a warm air heating shop in Holland, Mich. He says:

"First: Get in touch with your district engineer of the Lennox Furnace Company. They will help you all they can.

"Second: Try connecting 4 or 5 ft. of pipe, vertically, to your kitchen warm air run to eliminate draft from stairs which may be holding back the heat. If this is successful, make a permanent installation farther in the room."

J. M. Pratt, Alexandria, Ind.

Another short but pertinent suggestion comes from J. M. Pratt of Alexandria, Ind. He says:

"This problem, being an old job, is the hard part about it, but as it stands at the present time I would use 6-in. by 20-in. c.a. face in the bottom of the door to the servants' pantry, also in the kitchen stairway doors. Place a 10-in. by 30-in. c.a. face in the kitchen back of the door, and extend a 10-in. by 14-in. pipe down to within 10 ft. of the basement floor. I believe this will give better service than to attach a pipe to the old flue, and it will be more out of the way. I do not like to connect c.a. direct to furnace from kitchen.

"The vent from servants' room to attic would be better if extended up through the roof, as there is no roof ventilation.

"I would be careful to know that my c.a. faces were carrying full amount of c.a. and some to spare."

GRAVITY EXHAUST VENTILATION

Residence Ventilation [Continued]

By **PAUL R. JORDAN***

Another element in summer ventilation is the possible conservation of cool air. There is a great deal of value to this, but it must necessarily be left in the hands of the housewife. It is necessary, however, for satisfactory results, that the hottest air should be continuously withdrawn, although possibly in limited quantities.

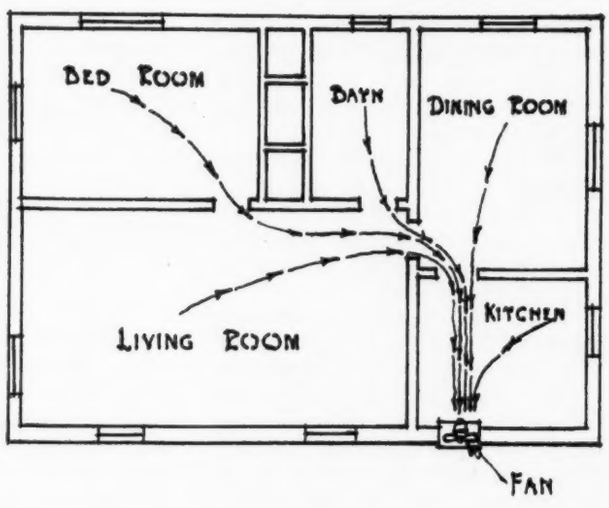
Cross ventilation by means of windows is fair in summer, but leaves a dead air pocket at the ceiling. In other words, cool air is blown in and out, but the hottest of the air remains. Cross ventilation in winter is terrible. In case nothing but window and door ventilation has been provided, it is better to occasionally throw open doors and windows and clear out the air completely, rather than to attempt to maintain continuous ventilation through partially opened windows.

For the moderate priced residence or the residence which is already built, there are two practical methods of ventilation, both of them exhaust systems. One of these is by the use of a ceiling fan in the kitchen. The other is by the use of gravity flues connected to a roof ventilator, by flues opening into kitchen and bathroom.

The first cost of these systems is approximately equal. The gravity system is without operating cost and the operating cost of fans of this type is very low. These exhaust fans have been usually used periodically, being turned on for a short time in the kitchen while a meal is being prepared and being closed off the rest of the day. They are, however, being used somewhat for continuous ventilation, setting up an area of low pressure in the kitchen which induces a constant movement of air toward, and not away from, the kitchen at all times. Seepage will take care of the necessary intake, and the entire apartment is ventilated. With a system of this kind, windows in the kitchen should be kept closed. Certain of these kitchen fans can be operated on less current than the smallest of electric light bulbs commonly used.

The fan is more positive than the gravity ventilating system, but gravity has the advantage of being continuous and the further advantage of taking care of both the bathroom and the kitchen. The fan ventilator is the best system of all, in that it combines both fan and gravity ventilation and that it also takes care of both bathroom and kitchen. It is more expensive both as to first cost and as to operation, but having greater capacity can be adapted to periodical operation of the fan coupled with continuous operation of the gravity element.

In a gravity system it is better to continue the ducts from the ceiling through the roof space or attic to the ventilator. In this case, a door should be put in the duct next to the roof, to be opened in summer and closed tightly in winter. It must be closed airtight during winter in order that it will not nullify the efficiency of the flue below it. In summer some kind of intake for



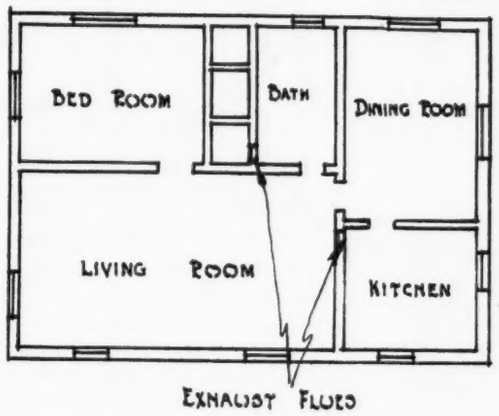
SHOWING USE OF WALL FAN

Few owners, or even contractors, realize that when an average sized ventilation fan is placed in the kitchen some degree of full house ventilation is established. In this drawing the trained arrows show how air currents are pulled from all parts of the floor. The capacity of the fan determines just how much pull you can exert on distant rooms

MOVEMENT OF AIR TOWARD KITCHEN (NEVER AWAY FROM IT)

**The Paul R. Jordan Co., Indianapolis, Ind.*

GRAVITY VENTILATION LAYOUT
(ALSO ADAPTABLE TO FAN VENTILATOR)



VENTILATING BOTH KITCHEN AND BATH

Gravity ventilation is not as immediate, nor as strong in air pull, as fan ventilation, nevertheless, the gravity ventilator works 24 hours a day, unless closed, with the result that day by day its effect is almost equal to that of an intermittent fan. In this layout the kitchen and the bath are ventilated

the roof space should be provided. An open hatch or stairway is satisfactory for this purpose. In the rooms below the ventilating registers at the floor should be open in winter; the ventilating registers at the ceiling should be closed in winter and open in summer.

A gravity system is entirely practical and is satisfactory from a ventilating standpoint, but possibly lacks something in spectacular appeal. The kitchen fan, with its flashing blades and its perceptible effect on air movement, has a psychological appeal not found in the other systems, but lacks roof space ventilation for summer cooling. The fan ventilator is the best of all and costs the most. It incorporates fan psychology, but lacks visibility in actual operation, although the air movement set up is perceptible.

Attention should be called to the fact that properly distributed ventilation helps heating and does not hurt it. This is particularly true of warm air heating, which type of heating lends itself best to the most modern phases of air conditioning, heating and ventilating.

Complete residence ventilation is obtainable by the most modest home owner at a price within his means. That it is worth more than it costs is an accepted fact.

Comments on Summer Cooling

By W. S. KINGSBURY

I BELIEVE that a little thought on what must be done to properly condition air in summer is of value at this time. There are several methods of attack—the foremost at this time being refrigeration. When refrigeration is used, humidity is controlled by lowering the temperature of the air to be conditioned until it deposits the excess moisture and mixing this conditioned air with larger volumes of recirculated air to bring the whole to the desired temperature and humidity.

Heat comes not alone from the sun but from the occupants of a building, from lights, from machinery if in plants, and from cooking in restaurants and homes. It is common practice to assume 480 B.t.u. per person per hour or 8 B.t.u. per minute. The heat given off by lights is based on electrical consumption in watts per square foot of floor area and is roughly 3.42 B.t.u. per watt of electrical energy used. Heat given off by machinery, and this includes stoves used in the home, is 3,415 B.t.u. per kilowatt hour or 2,547 B.t.u. per horsepower hour. Sun effect is of great importance when cooling load is to be figured. Radiant heat passes immediately through glass windows with a very small portion absorbed by the glass. The walls and roof, however, do not pass the sun heat so easily and the maximum heat passing into the walls at noon may not reach the interior until several hours later.

When refrigeration is used, the figure 288,000 B.t.u. absorbed by one ton of ice in melting is used. This is based on 24 hours and reduces to 12,000 B.t.u. per hour.

Heat entering the building is a heat flow problem reversed in its cycle from that of winter. The coefficients of heat transmission and basic laws are the same. The temperature differences between inside and outside are, however, relatively small.

The greater part of refrigeration capacity is required to lower humidity. The small part remaining is used to cool the air. Recent test installations using Silica Gel for absorbing the excess moisture from the air and in turn drawing this off into the outer air by means of heat hold promise of a decided reduction in ice tonnage required for home consumption. This unit is so designed that one half is absorbing moisture and the other is drying out. The cycle is regulated by clock timing and is approximately one hour for each cycle. Desirable temperatures vary with the type of building. The office building with occupancy continuous throughout the day may have temperature without regard to outside conditions, although in southern states a somewhat higher temperature is required, due to long acclimatization of the people of high outdoor temperatures. When occupancy is intermittent, as in a theater or store, it is necessary to regulate the temperature with respect to outside temperature. Where this is not done, the shock to one entering the cool and dry atmosphere from the outside usually, with the skin bathed in perspiration, is too great. A differential of 10-15 degrees is about the maximum.

One other phase of air cooling and dehumidifying should be mentioned. The building must be as near leakproof through doors, windows and walls as possible. The home of the future with summer cooling will have windows closed and, I believe, doors that revolve to prevent air leakage due to careless opening of doors for long periods.

New PRODUCTS

Columbus Humidifier Co. Announces Model "C"

The Columbus Humidifier Company, Columbus, Ohio, manufacturers of humidifying apparatus, announce a new low priced model to be known as model "C."

The new model is designed to fit any warm air furnace and will give practically any desired relative humidity under all operating conditions. The feature of the new model is the long type water pan which extends well across the hot area directly above the

castings. The unit is installed by cutting a hole in the bonnet and inserting the humidifier.

The pan has a maximum water area of 168 square inches and a minimum of 60 square inches. The area exposed to evaporation is adjustable anywhere down to almost 1/3 of the maximum capacity.

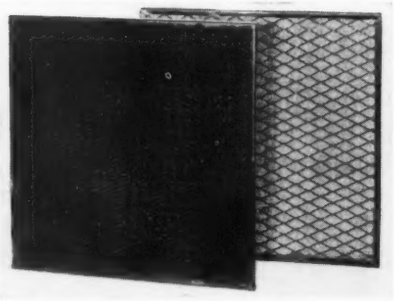
The evaporating pan and float chamber are in one piece of grey cast iron. The same non-drip, non-liming valve as used on the company's other models is used.

A leaflet describing the new model has been prepared and will be mailed to anyone writing to the company.

✦

American Air Filter Co. Announces Wafer Filter

The American Air Filter Company of Louisville, Ky., manufacturers of the original Reed Furnace Filter, are now manufacturing four types of filters suitable for warm air furnace application. Two of these filters are of the dry type and employ Airmat, a cellulose product, as filtering material. The American Wafer Filter illustrated operates on the oil impingement principle. It has an extremely low resistance to air flow, and is



well suited to use with any type of furnace fan or blower, even the booster fan. Maintenance has been greatly simplified. The accumulated dust is removed by placing the filter on the floor, and tapping lightly with a mallet or stick, after which a hand spray gun is used to apply another film of filter liquid. It is claimed by the manufacturers that only five minutes is required for cleaning and recharging a filter by this improved process.

✦

Improved Lyonore Metal Announced

Lyon, Conklin & Company, Inc., Baltimore, Maryland, manufacturers of Lyonore Metal—Chromium-Nickel alloy—announces an improvement of their product whereby through use of a new formula the addition of two semi-precious elements — chromium and nickel—are made to exert their fullest beneficial values. It is claimed the improved alloy possesses to a marked degree those two factors which determine the long life and durability of sheet metal.

The elements are so proportionately combined that they make the finished metal as near perfectly balanced as possible. The composition, with its very close grain and uniformity gives greater ductility and tensile strength. It is soft and can be formed into any shape with less labor cost.

Lyonore Metal is available in all standard widths, lengths and gauges. It is furnished in the form of galvanized sheets, corrugated sheets, galvanized roll roofing, conductor pipe, eave trough, fittings, tin plate and long terne plate.

Unit Construction Feature of New Oil Burning Range

A new oil burning range which burns No. 1 furnace oil, operates 75% cheaper than manufactured gas and will save restaurants, hotels, country clubs, and eating houses of all kinds thousands of dollars annually is claimed by Motor

Wheel Corp., Heater Division, Lansing, Mich.

Other features claimed are trouble-free operation, economical fuel consumption, and cooking qualities unequaled by other types of stoves.

The range and burner are both especially designed for commercial work and are assembled at the factory as a single unit, a perfectly matched combination.

✦

A New Material for Rust Prevention

Rust-tox, a new product of the Skybryte Company, 1919 East 19th Street, Cleveland, Ohio, is announced as an application which will eliminate rust formation and also prevent rust progression.

The new material is claimed to be resistant to heat up to 550 degrees, resistant to acid, fumes, smoke and salt air, and when applied to metal will check or prevent rust formation.

Information on the product is given in a folder which can be obtained by addressing the manufacturer.

News Items

Linde Air Products Announces Flux for Stainless Metals

Cromaloy Flux, a new item in the line of Oxweld welding fluxes distributed by the Linde Air Products Company, 30 East 42nd Street, New York, has been developed especially for use in welding the chromium-containing alloys, more generally known commercially as stainless steels or rustless irons.

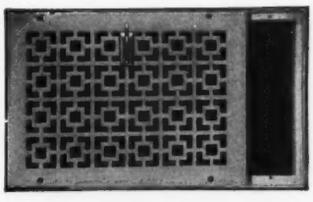
The ordinary fluxes used for welding or brazing are not satisfactory in welding stainless steel or rustless iron because they will not dissolve the infusible oxides, consisting chiefly of chromium oxide, which tend to form on the molten surface of these alloys. A satisfactory flux for use in welding these alloys must be sufficiently fireproof to protect the molten metal and hot metal adjacent to the weld from oxidation, and at the same time correctly compounded to dissolve the refractory chromium oxide with ease.

Because of its high solvent power for chromium oxide, and its high resistance to heat, Cromaloy Flux is especially prepared for this type of work.

✦

Auer Register Shows New Registers

The Auer Register Company, 3608 Payne Avenue, Cleveland, Ohio, has two new lines of registers ready for the trade. The first of these is the "French Heel Safety Register" which,



as the name indicates, is designed to offer a large free area and at the same time eliminate any danger of catching the heel because of wide spaces between bars. A number of special assembly and design features are claimed for this line of faces.

The second line announced is the Forced Air faces designed for air conditioning applications. These faces are furnished in special designs, worked out to give unusual attractiveness without any sacrifice of utility. The patented valve control permits dampering with the valve with permanent adjustment. There is also a line of flush frame, wall grilles, in several colors.

The particular features of these new products are described in two leaflets which may be had by writing the company.

Mr. and Mrs. George Harms Celebrate 50th Anniversary

There are very few folks in the warm air heating and sheet metal industry who do not know George Harms. All of them look upon him as one of the youngest and most active men in the trade.

Therefore, it will come as a surprise to many to know that March 14th will

be the Golden Wedding Anniversary of George and Mrs. "George."

Mr. and Mrs. Harms will hold "open house" at their home—717 Millman, Peoria, all day Sunday, March 13th, and we know will be more than happy to see any of the sheet metal or warm air heating folks who happen to be in Peoria at the time.

✧

C. L. Wurst, Quincy, Ill., Stages Notable Shop Dinner

On Thursday evening, January 28, C. L. Wurst, sheet metal contractor of Quincy, Ill:, staged a dinner and meeting for members of the South Quincy Commercial Club in the rooms of his shop. The dinner was, according to reports, one of the most interesting meetings in many months.

A feature of the meeting was a talk on "Conditioned Air Furnaces" delivered by J. B. Sauer of Peoria, Ill. This address, which outlined briefly, but clearly, the development of the modern heating system from a "hot air" furnace to the modern air conditioning plant was followed closely by the members of the organization.

During the dinner hour a quartet from the Y. M. C. A. sang, there was whistling and dancing and banjo and guitar selections.

The rooms of the tin shop had been especially arranged for the occasion. Swinging doors led to a bar where soft drinks were served. In a second room hundreds of parts of the new Quincy high school heating system, made on the spot, were arranged for convenient inspection.

In a third room the progress of stove manufacture was demonstrated. Cook stoves from 1844 to 1932, and heating stoves and gas stoves of 1900 and 1932 were displayed. The visitors were finally shown the latest Quincy-made hard coal burner, a Quincy stove company product, and the "Conditioned-air," a warm air furnace, manufactured in Peoria.

Much of the program of the evening was informal, the sixty-nine guests strolling about the tin shop while smoking, chatting and discussing the display in the various rooms.

✦

Ryerson Buys Steel Division of Taylor Company

Joseph T. Ryerson & Son, Inc., have purchased the stock and good will of the Steel Department of H. D. Taylor and Company of Buffalo, New York, effective January 15.

The stocks taken over by Ryerson include hot and cold rolled bars, shapes, plates, sheets, etc. The Ryerson Company, specializing in the distribution of finished steel products for the past ninety years, provides immediate shipment of practically all steel and allied products. Ryerson plants are now established in Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, and Jersey City.

✦

Michigan Association Announces Program

Michigan Sheet Metal and Roofers will hold their 1932 convention in Jackson, March 1 and 2. Headquarters of the convention will be in the Hotel Hayes. The board of directors will meet Monday night, February 29.

The printed program which has now been mailed indicates that a lively and interesting meeting is scheduled. Among the highlights of the meeting will be:

"Merchandising Forced Air Heating," by Platte Overton; "Problems of the Heating Contractor," by Albert J. Nydam; "After the Storm," by E. R. Shaw of the U. S. Chamber of Commerce.

Suitable entertainment in true Michigan style is promised.

New Literature

New Lenox Dealer Catalog Out

The Lennox Furnace Company, Marshalltown, Iowa, now have off the press their latest and most complete dealer's catalog. Copies of the new catalog can be had by writing the manufacturer on your letterhead.

The new catalog is the most pretentious book the company has published to date and rivals in composition the company's Manual for heating men.

The contents of the catalog is divided into six parts as follows: Merchandising Steel Furnaces, Torrid Zone Furnaces, Air Flo Air Conditioning, Equator Furnaces, Lennox Gas Equipment, and Accessories.

Each section takes up in detail a discussion of the subject. For example, the first section, Merchandising Steel Furnaces, gives the history of the steel furnace, explains what the features of this unit are, tells how to sell, outlines the construction and gives the manufacturer's sales and advertising helps.

The other sections describe the company's complete line of equipment. The various sections are profusely illustrated with photographs and cut away views. Complete tables are also given.

✦

American Rolling Mill Co. Leaflet of Ingot Iron

The American Rolling Mill Company, Middletown, Ohio, has prepared an illustrated leaflet showing the application of Armco Ingot Iron to outstanding buildings all over the country. Both heating and air conditioning installations are described and shown.

Anyone interested in this leaflet may get a copy by writing to the company.

✦

Illinois Travelers Issue New House Organ

The Traveler's Auxiliary to the Sheet Metal Contractors' Association of Illinois have mailed throughout Illinois the second copy of the organization's new house organ, "The Illinois Traveler."

This little leaflet is a departure from all present forms of publication in the trade. The material is presented by a new printing process which reproduces all kinds of typewritten and illustrative material true to original.

The editorial material in this second issue is decidedly snappy from the George Washington front cover to the very excellent letter written by George Harms which is published on the back page.

In between these two pages is a whole lot of peppy propaganda, a wealth of good humor and fun and some choice bits of news not to be found elsewhere.

✦

New Independent Register Catalogue Out

Independent Register and Manufacturing Company, 3747 East Ninety-Third Street, Cleveland, Ohio, have a new catalogue ready for mailing showing and describing the company's complete line of registers and grilles.

The material is divided into three main sections—Forced Air Registers, Wrought Steel Grilles and the line of "Fabrikated" faces.

Each type of unit is shown in detail together with complete tables of sizes, prices and finishes. A feature of the listing is the arrangement of the tables which itemizes the units by leader pipe sizes for convenience.

The company calls particular attention to its new line of Forced Air faces. These faces were designed from the results of a long series of tests and are said to be a very complete line especially adaptable to modern forced air needs. The feature of the line is the exceptionally large free area.

A copy of the catalogue will be mailed to any dealer writing to the company.

✦

The A. S. H.V. E. Guide, 1932

The American Society of Heating and Ventilating Engineers' Guide for 1932 is now available. This 10th edition is divided into four major sections; namely, the Text Section, the Manufacturers' Catalog Data Section, the Index to Modern Equipment and the Membership Roll of the Society.

The Text Section contains 40 chapters of important data on the design and installation of heating, ventilating and air conditioning systems. Approximately 50 per cent of the subject matter is entirely new, and every chapter has been rewritten and revised. Many subjects not previously treated in The Guide are included.

Here are some of the chapters touching our field:

Chapter 2. Estimating Heat Losses.
Chapter 3. Heat Transfer Through Materials and Constructions.
Chapter 4. Air Leakage from Buildings.
Chapter 5. Gravity Warm Air Heating Systems.
Chapter 15. Draft and Chimneys.
Chapter 16. Fuels.
Chapter 17. Mechanical Stokers.
Chapter 18. Oil Burners.
Chapter 19. Gas Heating Appliances.
Chapter 20. Heating with Electricity.
Chapter 23. Automatic Temperature Control.
Chapter 24. Ventilation of Public Buildings.
Chapter 25. Ventilation of Industrial Buildings.
Chapter 26. Natural Ventilation.
Chapter 27. Principles of Air Conditioning.
Chapter 28. Air Conditioning in Relation to Comfort and Health.
Chapter 29. Air Conditioning for Industrial Processes.
Chapter 30. Air Conditioning Apparatus.
Chapter 31. Central Fan Systems.
Chapter 32. Air Distribution Systems.
Chapter 33. Air Cleaning Devices.
Chapter 34. Fans and Motive Power.

The price of the book is $5.00. Orders can be sent to the Book Department of AMERICAN ARTISAN for prompt reply.

✦

Officers of the National S. M. Ladies' Auxiliary

The list of officers appointed at the Louisville convention of the National Sheet Metal Contractors' Association to serve for the Ladies Auxiliary are as follows:

President: Miss Mary A. O'Leary, Louisville, Ky.

First vice-president: Mrs. Ben Kolbenschlog, St. Louis, Mo.

Second vice-president: Miss Mildred Markle, Pittsburgh, Pa.

Third vice-president: Mrs. O. E. Hutchison, Louisville, Ky.

Secretary: Miss Dorothy Harpring, Louisville, Ky.

Treasurer: Miss Irene Fingles, Baltimore, Md.

Directors: Mrs. Albert Wagner, Mrs. Chas. Bolinger and Mrs. Geo. I. Ray.

A. O. SMITH BUILDING

(Continued from page 12)

between the base and the vertical members.

Due to the lightness of the metal and the fact that the sections were fabricated almost entirely in the shop, no scaffolding was required in the erection of the facade other than a portable stage which was hung from the roof. The window frame and pilaster sections were hoisted into position with but little effort, and the ease with which the building was closed in reflects the close co-operation between the elements of design and construction. Six days only were required to close in the first of the two side elevations. The second side was enclosed in one-half that time.

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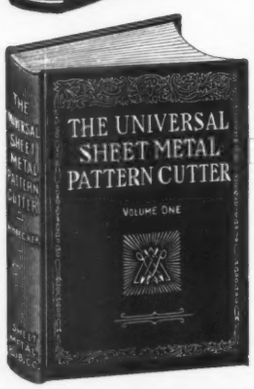

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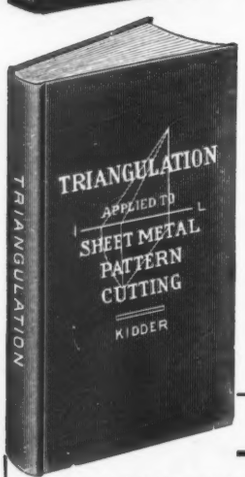

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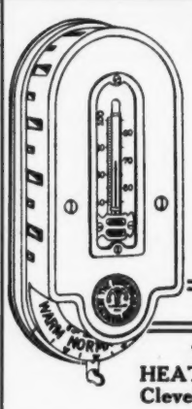

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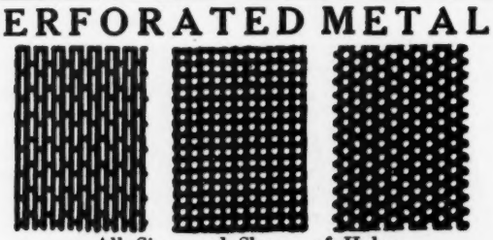

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American Fdy. & Furnace Co., Bloomington, Ill.

Air Washers

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Health Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.

Asbestos—Liquid

Technical Products Co., Pittsburgh, Pa.

Asbestos Covering and Paper

Stnadard Asbestos Co. of Chicago, Chicago, Ill.
Wilson, Grant, Inc., Chicago, Ill.

Ash Sifter

Diener Mfg. Co., G. W., Chicago, Ill.

Blast Gates

Berger Bros. Co., Philadelphia, Pa.

Blowers

American Fdry. & Furnace Co., Bloomington, Ill.
Forct-Air Co., Rockford, Ill.
A. Gehri & Co., Tacoma, Wash.
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Vent. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Paul R. Jordan Co., Indianapolis, Ind.

Brakes—Bending

Dreis & Krump Mfg. Co., Chicago, Ill.
Interstate Machinery Co., Chicago, Ill.

Brakes—Cornice

Dreis & Krump Mfg. Co., Chicago, Ill.

Brass and Copper

American Brass Co., Waterbury, Conn.
Revere Copper and Brass Inc., Rome, N. Y.

Cans—Garbage

Diener Mfg. Co., G. W., Chicago, Ill.

Castings—Malleable

Fanner Mfg. Co., Cleveland, Ohio

Ceilings—Metal

Globe Iron Roofing and Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Cement—Furnace

Lastik Products Corp., Pittsburgh, Pa.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Technical Products Co., Pittsburgh, Pa.

Cement—Roofing

Lastik Products Corp., Pittsburgh, Pa.

Chain—Furnace

Hart & Cooley Mfg. Co., Chicago, Ill.

Chaplets

Fanner Mfg. Co., Cleveland, Ohio

Cleaners—Furnace Vacuum

Breuer Elec. Mfg. Co., Chicago, Ill.
Brillion Furnace Co., Brillion, Wis.
Densmore & Quinlan Co., Kenosha, Wis.
National Super Service Co., Toledo, Ohio
Osborn Co., The J. M. & L. A., Cleveland, Ohio

Conductor Elbows and Shoes

Barnes Metal Products Co., Chicago, Ill.
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Globe Iron Roofing & Corrugatnig Co., Cincinnati, Ohio
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Conductor Fittings

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Berger Bros. Co., Philadelphia, Pa.
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David Levow, New York, N. Y.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Rival Strap Corp., New York, N. Y.

Conductor Pipe

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Berger Bros. Co., Philadelphia, Pa.
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Copper

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Revere Copper & Brass Inc., Rome, N. Y.

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Bertsch & Co., Cambridge City, Ind.

Cut-offs—Rain Water

Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Dampers—Quadrants—Accessories

Aeolus Dickinson, Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Parker-Kalon Corp., New York, N. Y.
Young Ventilating Co., Cleveland, Ohio

Dampproofings

Lastik Products Corp., Pittsburgh, Pa.

Diffusers—Air Duct

Aeolus Dickinson, Chicago, Ill.

Drive Screws—Hardened Metallic

Parker-Kalon Corp., New York

Eaves Trough

Barnes Metal Products Co., Chicago, Ill.
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Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
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Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

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American Fdy. & Furnace Co., Bloomington, Ill.
A. Gehri & Co., Tacoma, Wash.
A. H. Robinson Co., Massillon, Ohio

Filters—Furnace

American Air Filter Co., Inc., Louisville, Ky.
A. Gehri & Co., Tacoma, Wash.
Kleenaire Filter Co., Stevens Point, Wis.

Fluxes—Soldering

Kester Solder Co., Chicago, Ill.

Forming Rolls

Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.

Furnace Cleaners

(See Cleaners—Furnace Vacuum)

Furnaces for Gas or Oil

Dail Steel Products Co., Lansing, Mich.
Health-Air Systems, Ann Arbor, Mich.

Furnaces—Gas

American Fdy. and Furnace Co., Bloomington, Ill.
Henry Furnace & Foundry Co., Cleveland, Ohio
Lennox Furnace Co., Marshalltown, Iowa
Meyer Furnace Co., Peoria, Ill.
Payne Furnace and Supply Co., Beverly Hills, Calif.
A. H. Robinson Co., Massillon, Ohio
Round Oak Furnace Co., Dowagiac, Mich.

Furnaces—Gas Auxiliary

Forest City Foundries Co., Cleveland, Ohio

Furnaces—Oil Burning

Motor Wheel Corp., Heater Div., Lansing, Mich.

Furnaces—Warm Air
(See Also Unit Air Conditioners)

Agricola Furnace Co., Gadsden, Ala.
American Fdy. & Furnace Co., Bloomington, Ill.
Andes Range & Furnace Corp., Geneva, N. Y.
Brillion Furnace Co., Brillion, Wis.
Dail Steel Products Co., Lansing, Mich.
Deshler Foundry & Machine Works, Deshler, Ohio
Enterprise Boiler & Tank Works, Chicago, Ill.
Forest City Foundries Co., Cleveland, Ohio
Graff Furnace Co., Scranton, Pa.
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Peerless Foundry Co., Indianapolis, Ind.
Round Oak Furnace Co., Dowagiac, Mich.
Schwab Furnace & Mfg. Co., Cedar Grove, Wis.
Waterman-Waterbury Co., Minneapolis, Minn.

Gages—Draft

Ellison Draft Gage Co., Chicago, Ill.

Grilles

Auer Register Co., Cleveland, Ohio
Chicago Perforating Co., Chicago, Ill.
Harrington & King Perforating Co., Chicago, Ill.
Hart & Cooley Mfg. Co., Chicago, Ill.
Independent Register & Mfg. Co., Cleveland, Ohio

Guards—Machine and Belt

Chicago Perforating Co., Chicago, Ill.
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Berger Bros. Co., Philadelphia, Pa.

Handles—Furnace Door

Fanner Mfg. Co., Cleveland, Ohio

Handles—Soldering Iron

Parker-Kalon Corp., New York, N. Y.

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Agricola Furnace Co., Gadsden, Ala.
Motor Wheel Corp., Heater Division, Lansing, Mich.
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Meyer Furnace Co., The Peoria, Ill.
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Columbus Humidifier Co., Columbus, Ohio
Diener Mfg. Co., G. W., Chicago, Ill.
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Meyer & Bro. Co., F., Peoria, Ill.
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Interstate Machinery Co., Chicago, Ill

Machinery—Rebuilt

Interstate Machinery Co., Chicago, Ill.

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Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa
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Parker-Kalon Corp., New York, N. Y.
Viking Shear Co., Erie, Pa.
Whitney Mfg. Co., W. A., Rockford, Ill.

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Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Miters

Barnes Metal Products Co., Chicago, Ill.
Berger Bros. Co. Philadelphia, Pa.
Braden Mfg. Co., Terre Haute, Ind.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

(Continued on page 38)

BUYERS' DIRECTORY

(Continued from page 36)

Nails—Hardened Masonry
Parker-Kalon Corp., New York, N. Y.

Paint—Roof
Lastik Products Co., Inc., Pittsburgh, Pa.

Perforated Metals
Chicago Perforating Co., Chicago
Harrington & King Perforating Co., Chicago, Ill.

Pipe and Fittings—Furnace
Henry Furnace & Fdy. Co., Cleveland, Ohio
Meyer & Bro., F., Peoria, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Peerless Foundry Co., Indianapolis, Ind.

Pokers—Furnace
Fanner Mfg. Co., Cleveland, Ohio
Independent Reg. & Mfg. Co., Cleveland, Ohio

Pulleys—Furnace
Hart & Cooley Mfg. Co., Chicago, Ill.

Punches
Bertsch & Co., Cambridge City, Ind.
Interstate Machinery Co., Chicago, Ill.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

Punches—Combination Bench and Hand
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.

Punches—Hand
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Parker-Kalon Corp., New York, N. Y.
W. A. Whitney Mfg. Co., Rockford, Ill.

Radiator Cabinets
Hart & Cooley Mfg. Co., Chicago, Ill.

Registers
Auer Register Co., Cleveland, Ohio
Forest City Foundries Co., Cleveland, Ohio
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Independent Register & Mfg. Co., Cleveland, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Registers—Wood
Auer Register Co., Cleveland, O.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Regulators—Automatic Heat
Hart & Cooley Mfg. Co., Chicago, Ill.
Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.
Modern Heat Regulator Co., Cleveland, Ohio
White Mfg. Co., Minneapolis, Minn.

Repairs—Stove and Furnace
Brauer Supply Co., A. G., St. Louis, Mo.
Des Moines Stove Repair Co., Des Moines, Iowa
Northwestern Stove Repair Co., Chicago, Ill.
Peerless Fdry. Co., Indianapolis, Ind.

Ridging
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Rings—Furnace Casing
Forest City Foundries Co., Cleveland, Ohio

Roof Flashing
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Roofing—Iron and Steel
American Rolling Mill Co., Middletown, Ohio
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., The, Newport, N. Y.
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Republic Steel Corp., Youngstown, Ohio

Roofing—Tin and Terne
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Newport Rolling Mill Co., Newport, Ky.
Republic Steel Corp., Youngstown, Ohio

Rubbish Burners
Hart & Cooley Mfg. Co., Chicago, Ill.

School—Sheet Metal Pattern Drafting
St. Louis Technical Institute, St. Louis, Mo.

Schools—Warm Air Heating
St. Louis Technical Institute, St. Louis, Mo.

Screws—Hardened Metallic Drive
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Parker-Kalon Corp., 200 Varick St., New York

Screws—Hardened Self-Tapping, Sheet Metal
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Parker-Kalon Corp., New York

Screens—Perforated Metal
Chicago Perforating Co., Chicago, Ill.
Harrington & King Perforating Co., Chicago, Ill.

Scuppers
Aeolus Dickinson, Chicago, Ill.

Shears—Hand and Power
Interstate Machinery Co., Chicago, Ill.
Marshalltown Mfg. Co., Marshalltown, Iowa
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Viking Shear Co., Erie, Pa.

Sheet Metal Screws—Hardened, Self-Tapping
Parker-Kalon Corp., New York

Sheets—Alloy
Inland Steel Co., Chicago, Ill.
International Nickel Co., New York, N. Y.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Republic Steel Corp., Youngstown, Ohio

Sheets—Black, Corrugated, Galvanized
American Rolling Mill Co., Middletown, Ohio
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Republic Steel Corp., Youngstown, O.

Sheets—Copper
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Inc., Rome, N. Y.

Sheets—Copper Bearing Steel
American Rolling Mill Co., Middletown, Ohio
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Republic Steel Corp., Youngstown, Ohio

Sheets—Copper (Lead Coated)
American Brass Co., Waterbury, Conn.
Revere Copper & Brass Inc., Rome, N. Y.

Sheets—Iron
American Rolling Mill Co., Middletown, Ohio
Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Newport Rolling Mill Co., Newport, Ky.
Osborn Co., The J. M. & L. A., Cleveland, Ohio
Republic Steel Corp., Youngstown, O.

Sheets—Monel Metal
International Nickel Co., New York

Sheets—Nickel
International Nickel Co., New York

Sheets—Pure Iron Copper Alloy
Newport Rolling Mill Co., Newport, Ky.

Sheets—Refined Open Hearth Iron
American Rolling Mill Co., Middletown, Ohio

Sheets—Special Finish
American Rolling Mill Co., Middletown, Ohio
Inland Steel Co., Chicago, Ill.
Newport Rolling Mill Co., Newport, Ky.
J. M. & L. A. Osborn Co., Cleveland, Ohio
Republic Steel Corp., Youngstown, Ohio

Shingles and Tile—Metal
Globe Iron Roofing & Corrugated Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Skylights
Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Snow Guards
Berger Bros Co., Philadelphia, Pa.
David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

Solder
Kester Solder Co., Chicago, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Solder—Acid Core
Kester Solder Co., Chicago, Ill.

Solder—Rosin Core
Kester Solder Co., Chicago, Ill.

Solder—Self-Fluxing
Kester Solder Co., Chicago, Ill.

Soldering Furnaces
Diener Mfg. Co., G. W., Chicago, Ill.

Soot Destroyer
Saginaw Salt Prod. Co., Saginaw, Mich.

Specialties—Hardware
Diener Mfg. Co., G. W., Chicago, Ill.

Stars—Hard Iron Cleaning
Fanner Mfg. Co., Cleveland, Ohio

Stove Pipe and Fittings
Meyer & Bro. Co., F., Peoria, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Stove and Furnace Trimmings
Fanner Mfg. Co., Cleveland, Ohio

Strainers—Roof
David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

Straps—Ornamental Pipe
David Levow, New York, N. Y.
Rival Strap Corp., New York, N. Y.

Tinplate
Granite City Steel Co., Granite City, Ill.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.
Republic Steel Corp., Youngstown, O.

Tools—Tinsmith's
(See Machines—Tinsmith's)

Torches
Diener Mfg. Co., G. W., Chicago, Ill.
Osborn Co., The J. M. & L. A., Cleveland, Ohio

Unit Air Conditioners
American Fdry. & Furnace Co., Bloomington, Ill.
Andes Range & Furnace Corp., Geneva, N. Y.
Dail Steel Products Co., Lansing, Mich.
Henry Furnace & Fdry. Co., Cleveland, Ohio
Health-Air Systems, Ann Arbor, Mich.
Hess Warming & Ventilating Co., Chicago, Ill.
Lennox Furnace Co., Marshalltown, Iowa
May-Fiebeger Co., Newark, Ohio
Meyer Furnace Co., Peoria, Ill.
Midland Furnace Co., Columbus, Ohio
Motor Wheel Corp., Lansing, Mich.
Payne Furnace & Supply Co., Beverly Hills, Calif.
Waterman-Waterbury Co., Minneapolis, Minn.

Vacuum Cleaners—Furnace
(See Cleaners—Furnace Vacuum)

Ventilators—Ceiling
Hart & Cooley Mfg. Co., Chicago, Ill.
Henry Furnace & Fdy. Co., Cleveland, Ohio
Independent Reg. & Mfg. Co., Cleveland, Ohio

Ventilators—Floor
Aeolus Dickinson, Chicago, Ill.

Ventilators—Roof
Aeolus Dickinson, Chicago, Ill.
Berger Bros. Co., Philadelphia, Pa.
Burt Mfg. Co., Akron, Ohio
Jordan & Co., Paul R., Indianapolis, Ind.
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Water Pressure Regulators
Apex Regulator Co., Marshalltown, Ia.

Wood Faces—Warm Air
Auer Register Co., Cleveland, Ohio
Milcor Steel Co., Mil., Canton, Chgo., LaCrosse, K. C.

Alphabetical List *of* Advertisers

Firms represented in this issue are identified by the folio of the page on which their advertising appears. Advertising which appears in alternate issues is marked with an asterisk.

THE BUYERS' DIRECTORY APPEARS ON PAGES 36 AND 38

Classified Advertising

BUSINESS CHANCES

Lightning Rods—Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. L. K. Diddle Company, Marshfield, Wis.

Wanted to Buy—Established sheet metal and furnace shop for cash, in city of over 25,000. Reply to X-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

For Sale—At your own price—25 pounds 50/50 bar solder. Address S. Gard, 4639 West End Avenue, Chicago, Illinois. Telephone Mansfield 9132. C-546

For Sale—Well established furnace and sheet metal shop in St. Louis. A No. 1 tool, good truck, shop well stocked with material. Price, $800. Terms. Reason for selling, retiring. Address O-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

PHILIP V. W. PECK
PATENT AND TRADE MARK LAW
Barrister Building, Washington, D. C.
Y-544

For Sale—Set of tinner's tools. Consists of 8 foot steel brake, 30 inch square shears, 30 inch bar folder, slitting shears, bench tools, etc. All in good condition and priced to sell at once. Address E. Haverstock, Rt. 7, South Bend, Indiana. W-546

Wanted—To buy, or operate on shares, well established warm air heating and general sheet metal shop in fair sized city, by middle aged man and sons, who have had wide experience in all branches of the trade. At present am foreman in heating, ventilating and air conditioning shop. Give full information. Address J-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

For Sale—In southwestern Michigan, sheet metal business in good town of 1400 population. Good farming community. No furnace or sheet metal man here. Address M-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

For Sale—One register face for pipeless furnace. Copper oxidized cast iron, 45" square, 36" round in center. Name your own price. Address Charles P. Warner, 257 North 4th Street, Indiana, Pennsylvania. P-546

Shop Wanted—On commission basis by Licensed Master Plumber with full set of tools and small amount of money to invest. Can also do steam, vapor, hot water and hot air furnace work. Can read plans and estimate all the above work. Best of references as to ability, honesty, etc. Illinois preferred. Address R-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Wanted—Small hardware stock with sheet metal shop in connection in good town in south or southwest, of about 3 to 5 thousand population. Would consider shop only. Address all communications to Box 174, Williamsburg, Iowa. T-546

HELP WANTED

WANTED
Experienced furnace salesman for Missouri, Kansas, Nebraska, and Colorado territories. Well Known Line. Commission basis. Address
L-546, AMERICAN ARTISAN
139 North Clark Street Chicago, Ill.

SALESMAN WANTED
by an established manufacturer in the Steel Tank field to promote and develop the sales of a Boiler Plate Furnace. Must be familiar with gravity and fan heating and air conditioning. Must be experienced. Give references and remuneration expected. Address
S-546, AMERICAN ARTISAN
139 North Clark Street Chicago, Illinois

SITUATION WANTED

Situation Wanted—By technical school graduate. Wide experience in factory and general shop work. Address P-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

SITUATION WANTED
By Heating Engineer, broad acquaintance and experience, desires Indianapolis or Kansas City territory with progressive manufacturer or jobber. Unusual record—sales, advertising and engineering. Experienced in general stove line, gravity and forced air heating, automatic control, air conditioning and trunk line layout. Middle age, married, owner of home and car. References to character, integrity and ability. Eight years with present firm.
Address F-546, AMERICAN ARTISAN
139 N. Clark St. Chicago, Illinois

Situation Wanted—By sheet metal worker. Nineteen years experience in general sheet metal and latest warm air heating work. Can make plans, patterns, and put up work in first class finished manner. Would like to get with some firm who would at some time sell part or all. Prefer Illinois union shop. Address O-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—By young man 30 years old with sixteen years experience in all branches of the trade. Can estimate, cut patterns, handle men, and have the ability to close a job. Am now employed but am going to change March 1st. Married, strictly sober and of neat appearance. Address W. H. Sapp, 711 Highland Avenue, Albany, Georgia. T-545

Situation Wanted—By a first class sheet metal worker. Experienced in heating and ventilating of all kinds. A-1 neon sign builder. Will go anywhere. Address Lawrence H. Couchman, 324 Penn. Avenue, Wichita, Kansas. W-545

Situation Wanted—By sheet metal worker. Competent in all branches of the trade. Location immaterial. Correspondence solicited. Work must be reasonably steady. Address C. L. Summerson, 327 East Gage Avenue, Los Angeles, California. A-546

SITUATION WANTED

Situation Wanted—By A-1 mechanic, sheet metal worker and furnace man. Can read blueprints, estimate work, lay out patterns and take charge of shop. Have done all branches of work. Strictly temperate and reliable. Permanent position desired. Address B-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

Situation Wanted—By tinner. Steady reliable man, good on furnace and gutters, also general jobbing. Would like to locate in or near Elgin or small town near Chicago. Address S. Gard, 4639 West End Avenue, Chicago, Illinois. D-546

Situation Wanted—By A-1 sheet metal worker. Can do all kinds of sheet metal work, including cornice and skylight making. Have also had quite a bit of experience in roofing. Am under 30 years of age, and am married. Will go anywhere and stay as long as work is steady. Address G-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Ill.

Situation Wanted—A first class A-1 mechanic with more than twenty years experience in all lines of sheet metal work, wishes to hear from some one who needs a first class man. Can give best of references and go anywhere. Address Mechanic George, 154 Oakland Avenue, Macon, Georgia. H-546

Situation Wanted—By sheet metal apprentice, four years vocational training, High School graduate, one year's practical experience in roofing, etc. Good character, best of references. Address Sheet Metal Department, Mooseheart, Illinois. K-546

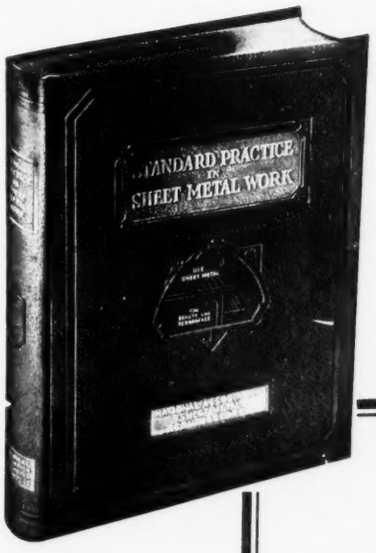
Situation Wanted—A good tinner, plumber, fitter and repair man wants to run shop on commission or commission and small wages, with privilege to rent or buy later. Please state particulars. Am middle aged and married. West of Mississippi river preferred. Address F-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—Engineer or sales engineer, gravity and fan heating, air conditioning, member A. S. H. V. E., A. S. M. E., twenty years successful retail and wholesale experience. Address K-545, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

Situation Wanted—By first class tinner and hardware man. 19 years experience, making specialty of warm air heating. Have complete knowledge of layout, estimating, sales. Can do plumbing, steam and hot water heating, installing of oil burners. Experienced in electric wiring and radio repairing. Good fast worker. Steady, reliable, married, 39 years old. Good references from past employers. Address E-546, AMERICAN ARTISAN, 139 North Clark Street, Chicago, Illinois.

TOOLS AND MACHINERY

Wanted--At once. An eight foot Chicago brake. Must be cheap. Address Wm. Mooring, Sheldon, Iowa. J-545



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